# PIT AND QUARRY

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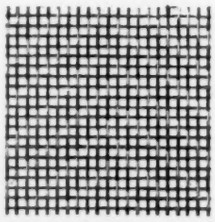
## CONVENTION ISSUE

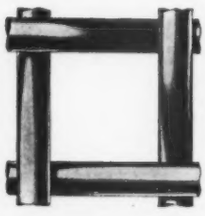
National Sand and Gravel, Ready-Mixed Concrete, and Crushed Stone Associations

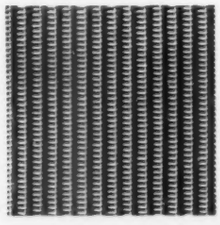
# LUDLOW-SAYLOR

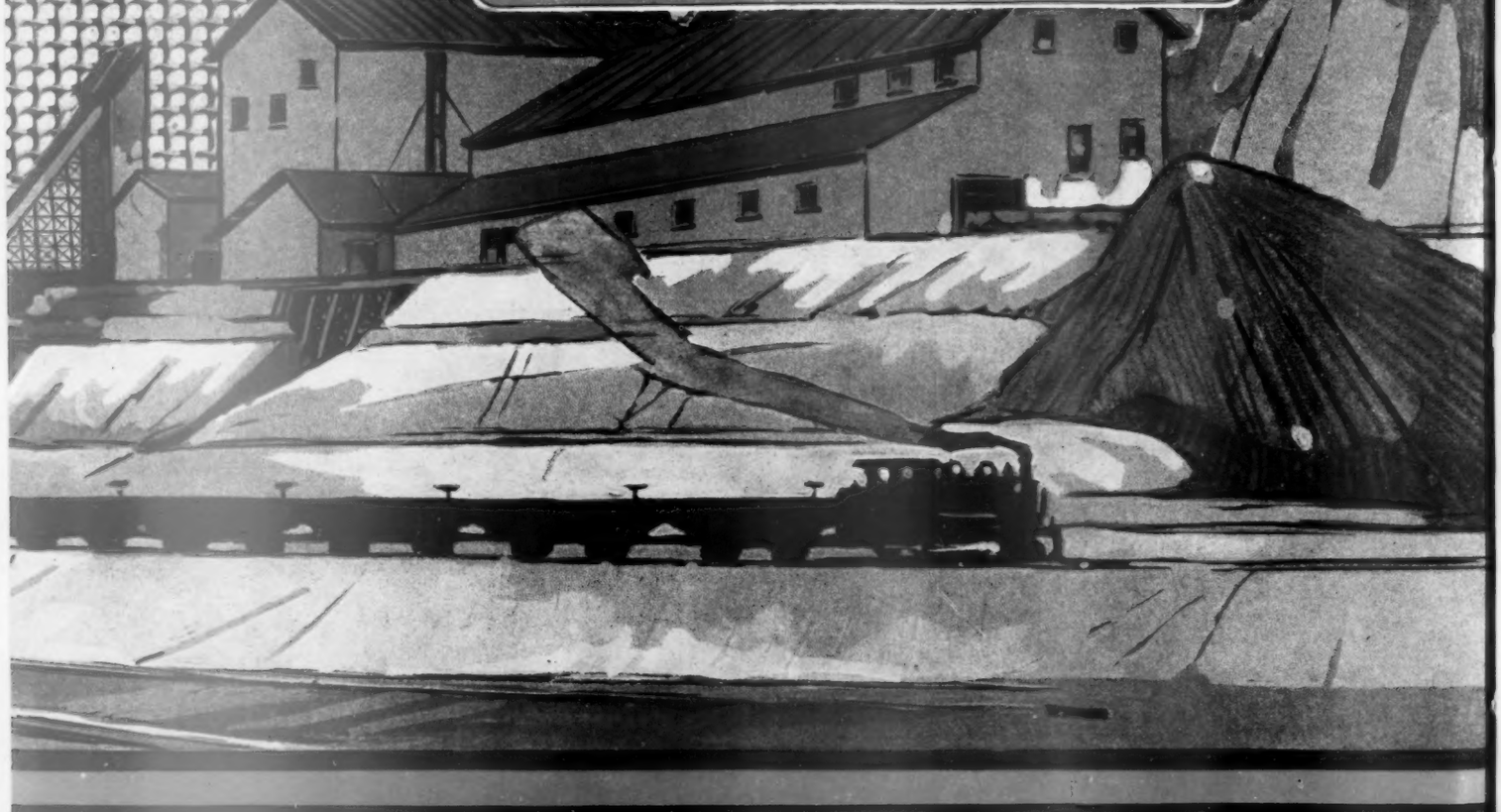
# "Perfect"

**Wire Cloths and Screens**
**of Super-Loy, Steel,**
**Galvanized Steel,**
**Stainless Steel,**
**Phosphor Bronze, Brass,**
**Copper, Monel, Aluminum,**
—any special metal, for any sort of service.









The LUDLOW-SAYLOR
WIRE COMPANY
SAINT LOUIS

The background shows "Perfect" Steel Wire Cloth which has been hot-dip galvanized after woven.

Steel wire cloths 8 meshes to the inch or coarser may be galvanized after weaving in long lengths, in widths up to 54 inches. Wider widths may be galvanized after weaving in short lengths. Finer meshes may be woven of wire which has been galvanized before weaving.

**A HANDFUL OF DUST** What does it mean to you? It *can* mean the difference between profit and loss in your business. Unless dust is kept under control by modern dust collection equipment, your business may suffer from one or more of these serious losses—

RECLAMATION LOSSES—*due to waste of valuable dusts, as in ore refineries, cement kilns, foundry shake-down rooms, etc.*

CONTAMINATION LOSSES—*through dust pollution of your product or process.*

BREAKDOWN LOSSES—*through expensive repairs and delays caused by machinery breakdowns due to dust.*

WORKING EFFICIENCY LOSSES—*through spoilage and slack production that result from grimy walls and poor lighting.*

GOOD WILL LOSSES—*due to community annoyance over excessive flue dust dispersal from your stacks.*

Buell Dust Collectors, employing the patented, highly efficient Van Tongeren system, can minimize these losses for you. They are already profitably at work for hundreds of businesses. You will find them outstanding for low first cost and negligible maintenance. Buell engineers will be glad to survey your dust collection problems without obligation.

**INVESTIGATE BUELL AND $AVE MONEY!**

*Only Buell Cyclones have a Dust Pocket*

**"DUST COLLECTION" and "FLY ASH CONTROL"**
are two interesting booklets we shall be glad to mail upon request . . .

**SUITE 5000, 12 CEDAR STREET, NEW YORK**

**BUELL ENGINEERING COMPANY, INC.**

buell DUST COLLECTORS

**Wherever located, you will be quickly served through sales offices of either BUELL ENGINEERING CO., or B. F. STURTEVANT CO.**

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# "Imagine— ME talking about valve seat inserts!"

IT IS LAST SUMMER, and here we are at the store picnic—about 100 of us girls. When all of a sudden, right after the peanut race, somebody yells—"Here comes the eats!" And sure enough, here they come—a whole truck-load of 'em, that pulls right up back of where Betty and Pearl and me are sitting on a bench.

Well, Betty is right in the midst of telling Pearl and me about what happened the other night at the casino, when the fellow that is driving this truck with the eats in it gets out and says kind of with a whistle—

"Boy, what a honey!"

Well, you could have cut the silence with an ice pick.

"Imagine that fresh guy," I says. "Let's just ignore him."

So Betty and Pearl they do just that, wandering away very hoity-toity.

But me, I didn't think it would do any harm to see what the guy looks like, anyway. So, with a stern frown on my face, I turn around. Just in time to hear him say—

"The sweetest job I ever saw in my life!"

So, instead of frowning, I *glare*, expecting to shrivel this masher once and for all.

And, I tell you, I got the shock of my life!

He wasn't looking my way at all! He was standing with his elbows on the front end of this truck of his, mooning like a love-sick calf! Can you feature that!

"Well, how about unloading some sandwiches?" I asks.

"Hello," he says, like he's in a fog. He wasn't so bad-looking.

"Ain't she a dream?" he says.

"Who?" I asks, innocent.

"That Ford," he goes on, looking at me like I was about as important as a can of hominy.

"Sweet runnin', quiet, comfortable, and the easiest job on gas and oil I ever drove. Come here once and just give this V-8 engine the double-O."

And before I knew it he had me by the hand and we were lookin' under the hood of that precious truck of his.

"Look at that engine," he says. "Tungsten steel inserts in every valve port, intake and exhaust."

"Wonderful," I says. And me not knowing a valve seat insert from a crepe suzette.

"Built for low-cost running, that's what I like. I've had trucks before, but, Sister, this Ford takes the cake."

"And I'll take a sandwich," I put in for a hint. But he didn't hear.

"Not only economical, but she's got power along with it. Flattens out hills like a bird. And she's as fast as Joe Louis' left hook. And besides, ain't she a *handsome* baby?"

This time I was *hoping* he meant me. But he didn't. So I saw I had to do something—and fast.

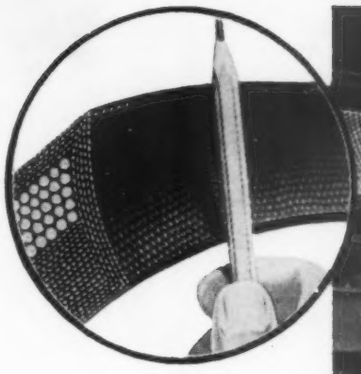
"I bet you wouldn't like to take a girl for a ride in that truck of yours, would you?" I asks, kind of twisting my toe in the ground.

"I sure would," he said, not letting go of my hand on account of I was holding his too tight, if you know what I mean. "Two can ride as cheap as one in this truck."

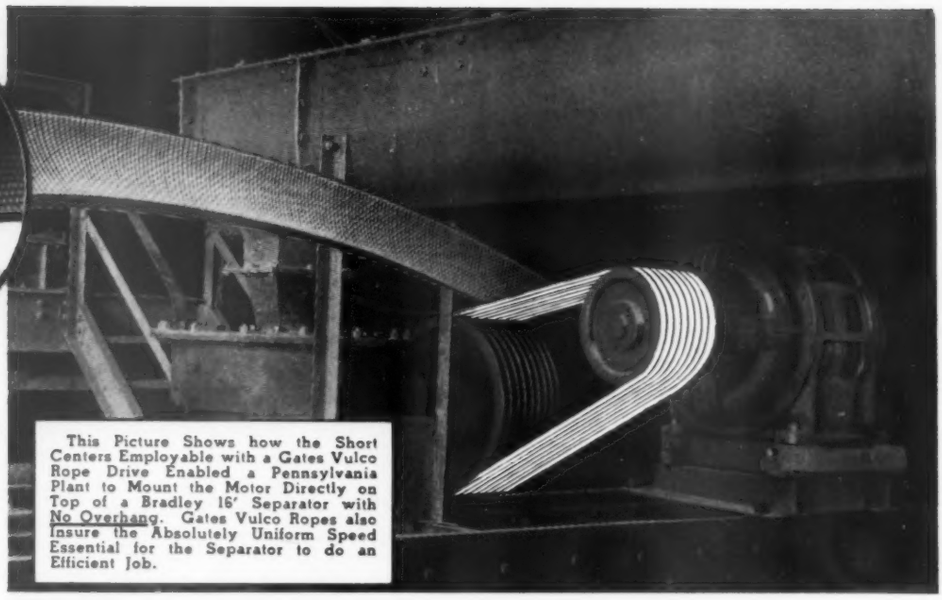
Well, that's how it all started. I think Ford Trucks are wonderful, too, now—just like Joe does.

## FORD V-8 TRUCKS and Commercial Cars

*Ford Motor Company, Builders of Ford V-8 and Mercury Cars, Ford Trucks, Commercial Cars, Station Wagons and Transit Buses*



The **Concave Side** IS A GATES PATENT



This Picture Shows how the Short Centers Employable with a Gates Vulco Rope Drive Enabled a Pennsylvania Plant to Mount the Motor Directly on Top of a Bradley 16' Separator with No Overhang. Gates Vulco Ropes also Insure the Absolutely Uniform Speed Essential for the Separator to do an Efficient Job.

# Make This Simple Test

## See for yourself just how the Concave Side makes

## A BIG SAVING ... in your V-Belt Costs

**What Happens When a V-Belt Bends**

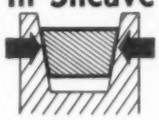
Here's a simple and interesting test that tells an important story:

Take any V-belt that has straight sides. Bend that V-belt while you grip its sidewalls between your fingers and your thumb. You will feel the sides of the belt bulge out—as shown in figure 1 on the left. Clearly, that out-bulge gives the belt a shape that does not fit its sheave groove.

Now look at figure 2. There you see what happens when you bend a belt that is built with the patented concave sides. You get a similar change in sidewall shape—but what a different result! The precisely engineered concave side becomes perfectly straight. There is no outbulge:—the full side-width of the belt *uniformly* grips the sheave groove wall. This means *uniform* wear—*longer life*. Again, this full side-width grip on the pulley carries heavier loads without slippage—a big saving in belt costs and a saving in power too!

The Gates Vulco Rope is the *only* V-belt built with the patented concave side.

**V-Belt In Sheave**



It's the *sides* of a V-Belt that do all the *gripping* and get all the *wear*. That's why *longer life* for the *sides* means *longer life for the belt*.

## THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

# GATES VULCO ROPE DRIVES

CHICAGO, ILL., 1524 South Western Ave. HOBOKEN, N. J., Terminal Building BIRMINGHAM, ALA., 1631 1st Ave., S. LOS ANGELES, CAL., 741 Warehouse St.

DENVER, COLO., 999 South Broadway DALLAS, TEX., 2213 Griffin Street PORTLAND, ORE., 333 N. W. 5th Ave. SAN FRANCISCO, CAL., 2700 16th St

# FIFTY MILLION SHOTS CAN'T BE WRONG

The figures tell the story—over 50,000,000 Atlas Manasite Detonators already have been used. Blasters start using Atlas Manasite caps for the extra margin of safety—and keep on using them because the safety feature is combined with complete *dependability* in action.

Through decreased sensitivity to impact and friction, Atlas Manasite Detonators make safety precautions more effective—at no increase in price. No wonder they have been accepted as a great step forward in making blasting safer.

## ATLAS POWDER COMPANY, WILMINGTON, DEL.

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*Everything for Blasting*

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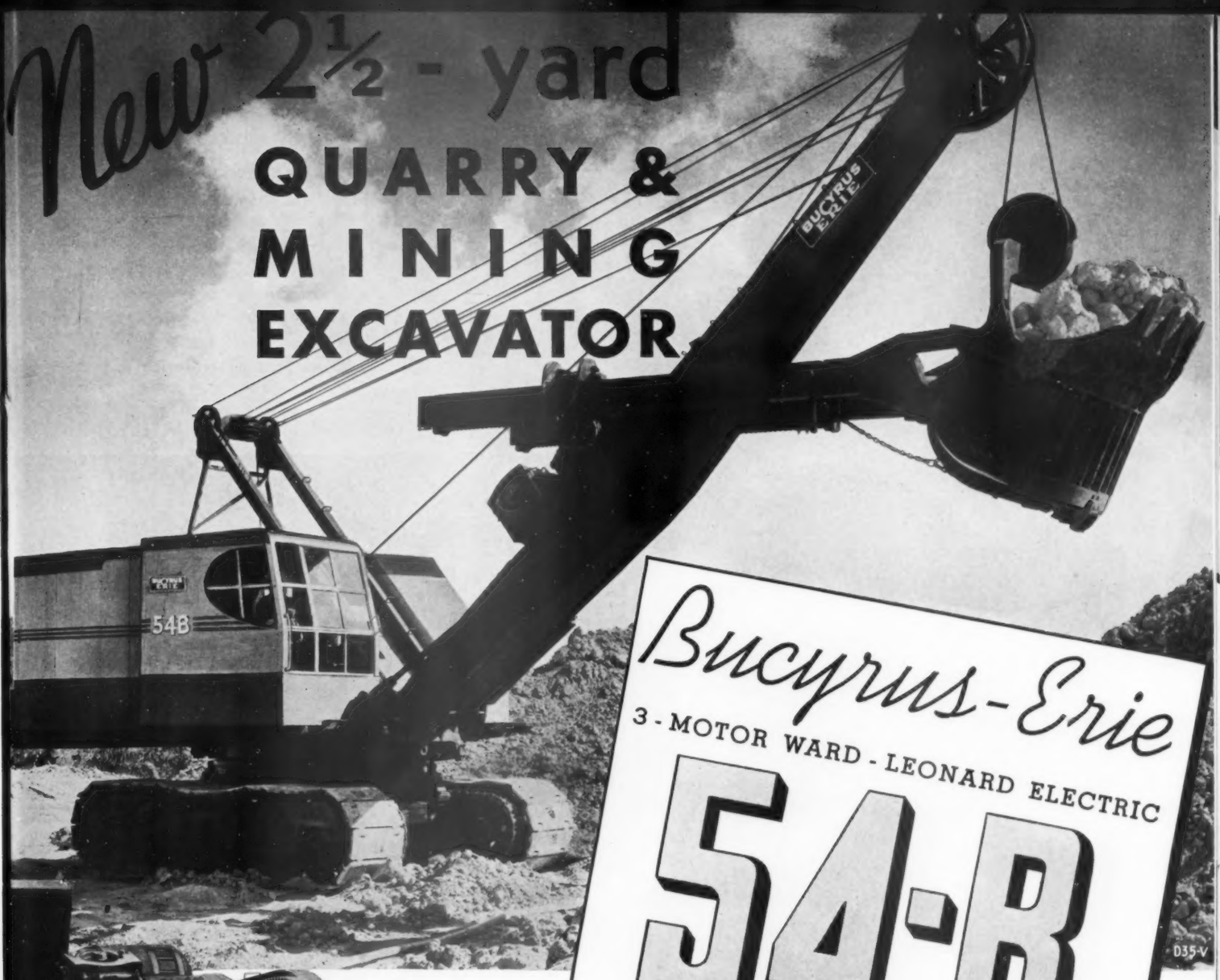
| Chicago, Ill. | Los Angeles, Calif. | Picher, Okla. | San Francisco, Calif. | Wilkes-Barre, Pa. |
| Denver, Colo. | Memphis, Tenn. | Pittsburg, Kansas | Seattle, Wash. | |

# ATLAS

EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES

# New 2½-yard QUARRY & MINING EXCAVATOR




## Bucyrus-Erie

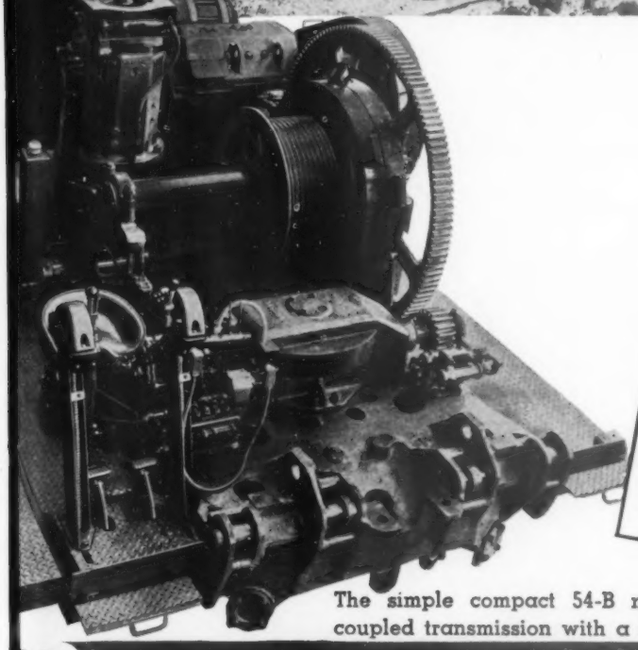
3-MOTOR WARD-LEONARD ELECTRIC

# 54-B

D35-V

**Built to set new records in economical high-speed production, the 54-B is years ahead in design, construction and performance. This addition to a famous line of quarry and mining shovels reflects the ever widening background of experience upon which the designs and constructional details of all Bucyrus-Erie shovels and draglines are based. Although it is the newest and smallest of the quarry shovels, it takes its place with the strength, speed and weight-saving common to all Bucyrus-Erie machines.**

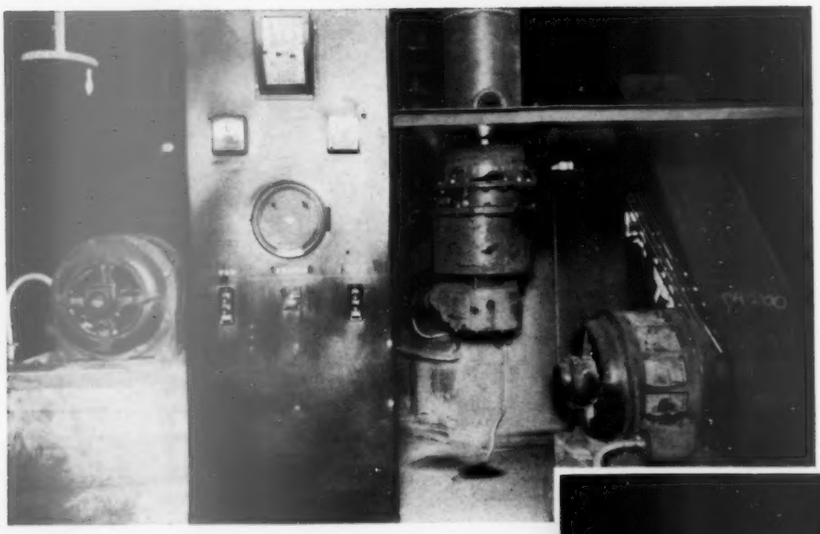
**Put the 54-B at work on your job — take advantage of its ability to give you increased output capacity and increased profits.**



The simple compact 54-B machinery provides short-coupled transmission with a minimum of moving parts.

# Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

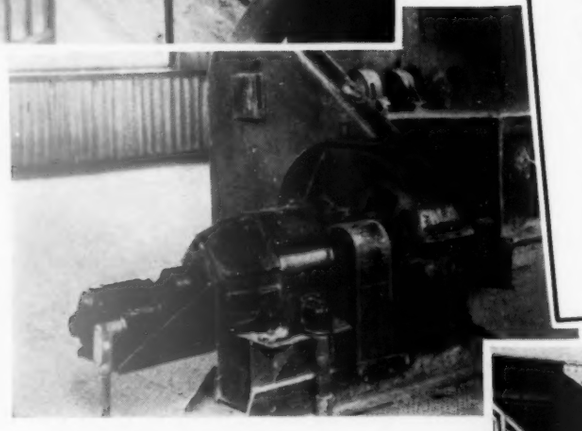


**SQUIRREL-CAGE INDUCTION MOTORS FOR AUTOMATIC, MOTOR-DRIVEN COAL PULVERIZERS**

A most important step in modernization is the installation of automatic unit coal pulverizers to reduce coal-grinding cost, eliminate coal wastage, and gain more flexibility of operation. General Electric has co-operated with the manufacturers of these units to assure the right type of motor drive and control for each of the three functions: feeding, pulverizing, and blowing.

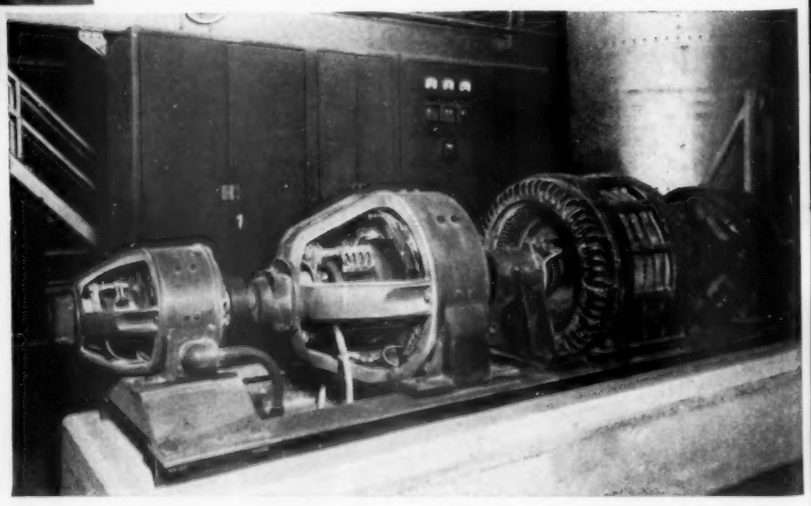
# What Kind

**HERE are examples of some of the ways General Electric engineering is aiding cement and other rock-products plants to get lower costs and a higher-quality product. Consider them in the light of your particular requirements, and take your questions to the nearest G-E representative. He will be glad to help you. General Electric, Schenectady, N. Y.**



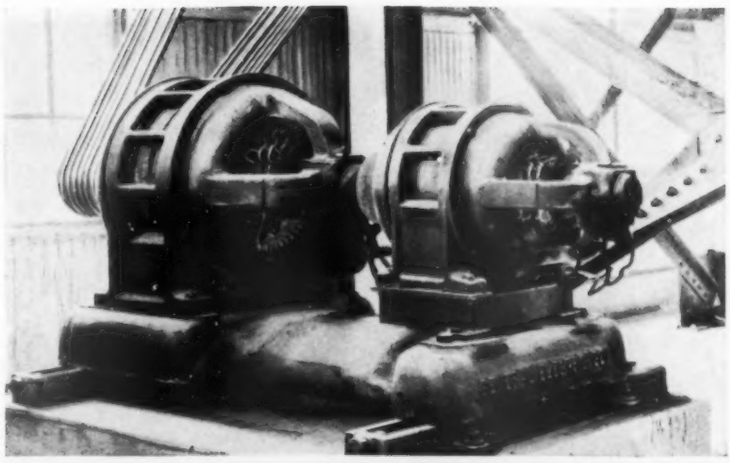
**ADJUSTABLE-VOLTAGE DRIVE FOR CEMENT KILNS**

General Electric engineers have successfully applied adjustable-generated-voltage control to cement-kiln drives. Two or more kilns can now be powered by one synchronous motor-generator set. Yet each kiln retains completely independent speed adjustment. This drive gives cement and lime kilns ideal starting conditions and smooth, flexible speed-control by merely adjusting the strength of its generator field. Each feeder drive is synchronized with its kiln drive but the ratio of feeder speed to kiln speed may be modified by a "vernier" speed ratio adjustment.



### POWER SELSYNS CONTROL FEED TO KILN

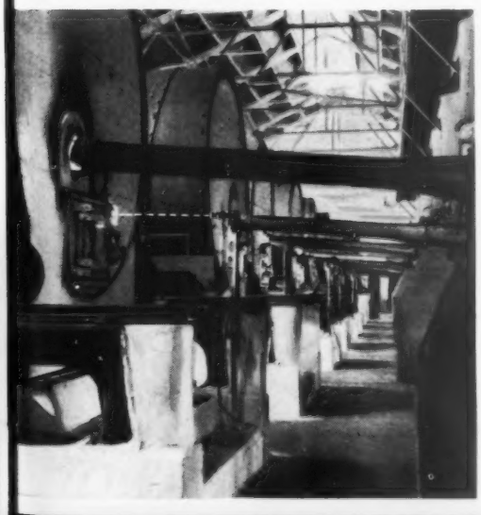
Synchronizing the rate of feed with the speed of the kiln by means of power Selsyns was first accomplished by G-E engineers. This Selsyn transmitter, driven by a G-E induction motor, maintains the feeder motor in fixed speed relation with the kiln. Users report that these sturdy, self-contained units assist in producing high uniformity of clinker, minimize mud-ring formations, and prolong the life of the kiln lining.



# of Modernization Does YOUR Plant Need?

### HOW "ELECTRIC EYES" CONTROL CLINKERING TEMPERATURE

Below are ten kilns using the recent G-E development for controlling kiln temperature—the photoelectric pyrometer. These "electric eyes" are instantly and constantly responsive to the energy radiated from the clinker on which they are trained. Thus the kiln temperature can be electrically indicated and recorded. The kiln speed, in turn, can be automatically varied within a preset range to hold the temperature within the zone previously selected manually by the burner. Result—elimination of the temperature variable and a more uniform product.



### GEAR-MOTORS FOR LOW SPEED

Rock-products plants are using G-E gear-motors as low-speed drives because their compactness saves space and reduces installation costs. G-E gear-motors have the high efficiency and favorable power-factor of normal-speed motors. Even gear-tooth pressure through the planetary type of transmission and a continuous oil bath for the gears assure little wearing of parts, consequently long, low-cost service.

GENERAL ELECTRIC

011-582

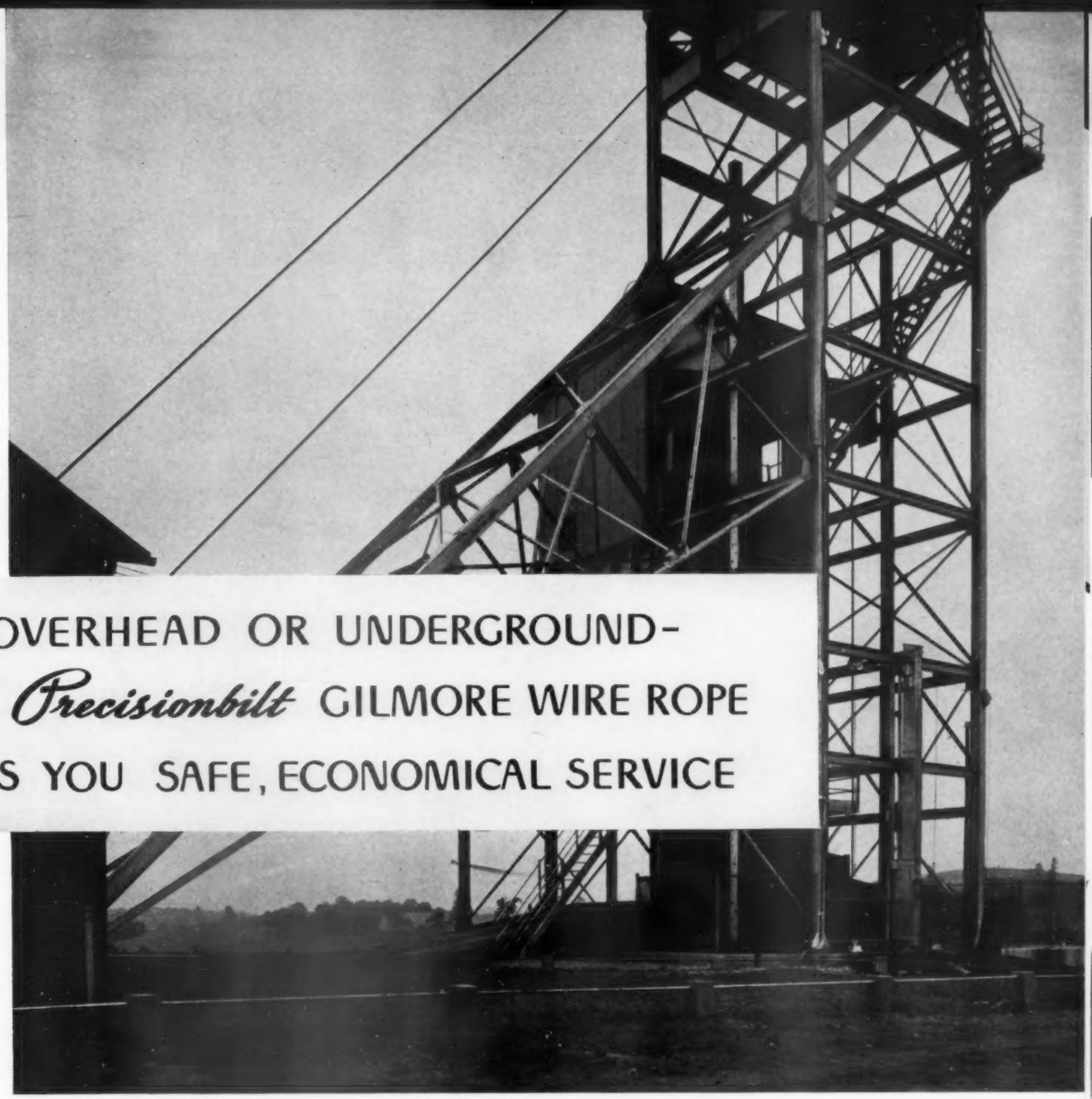
# POMONA LENDS A HAND!

IN excavating material for the massive Prado Dam now under construction near Corona, California, large flows of water were encountered to hinder operations. Water to be handled varied from a 100 g.p.m. against a 100 - 140 foot discharge head up to 2,000 g.p.m against a discharge head of 50-60 feet above bottom of pits. The high percentage of sand, gravel and small pebbles that had to be handled with the water pumped (sometimes as high as 30%) offered a real pumping problem. Ordinary pumps lasted but a few days. Impellers, bearings, sealing rings and even the casing cut and eroded until complete pump replacement was necessary. Today 15 Pomona water-lubricated turbine pumps with the combined capacity of 7500 g.p.m. adequately handle the problem and with minimum expense for maintenance and repairs. The great adaptability of Pomona pumps for your type of pit and quarry operation will be gladly shown to you upon request and without obligation. Write us today for further information.

## POMONA *Water-Lubricated* PUMPS

**POMONA PUMP CO.**

**ST. LOUIS, MO. POMONA, CALIF.**



# OVERHEAD OR UNDERGROUND—
# J&L *Precisionbilt* GILMORE WIRE ROPE
# GIVES YOU SAFE, ECONOMICAL SERVICE

Uniformity — strength — safety — abrasion-resistance — these are the qualities of J & L Gilmore Wire Rope which give you maximum economy in your mining operations. Made exclusively of J & L Controlled Quality (CQ) Steel, on the world's newest wire rope making machines, Precisionbilt ropes are uniform in strength and section and scientifically lubricated throughout. An inherent quality of safety, in Precisionbilt ropes, comes from the skill of our workmen and their deep understanding that human life may depend upon every length of rope they make.

When you need replacement wire rope for your present equipment — or when you order new equipment — specify J & L Precisionbilt. It will give you long, satisfactory service. Write today for our catalog of mining and quarry ropes.

## JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS

GILMORE WIRE ROPE DIVISION
PITTSBURGH, PENNSYLVANIA

J&L STEEL

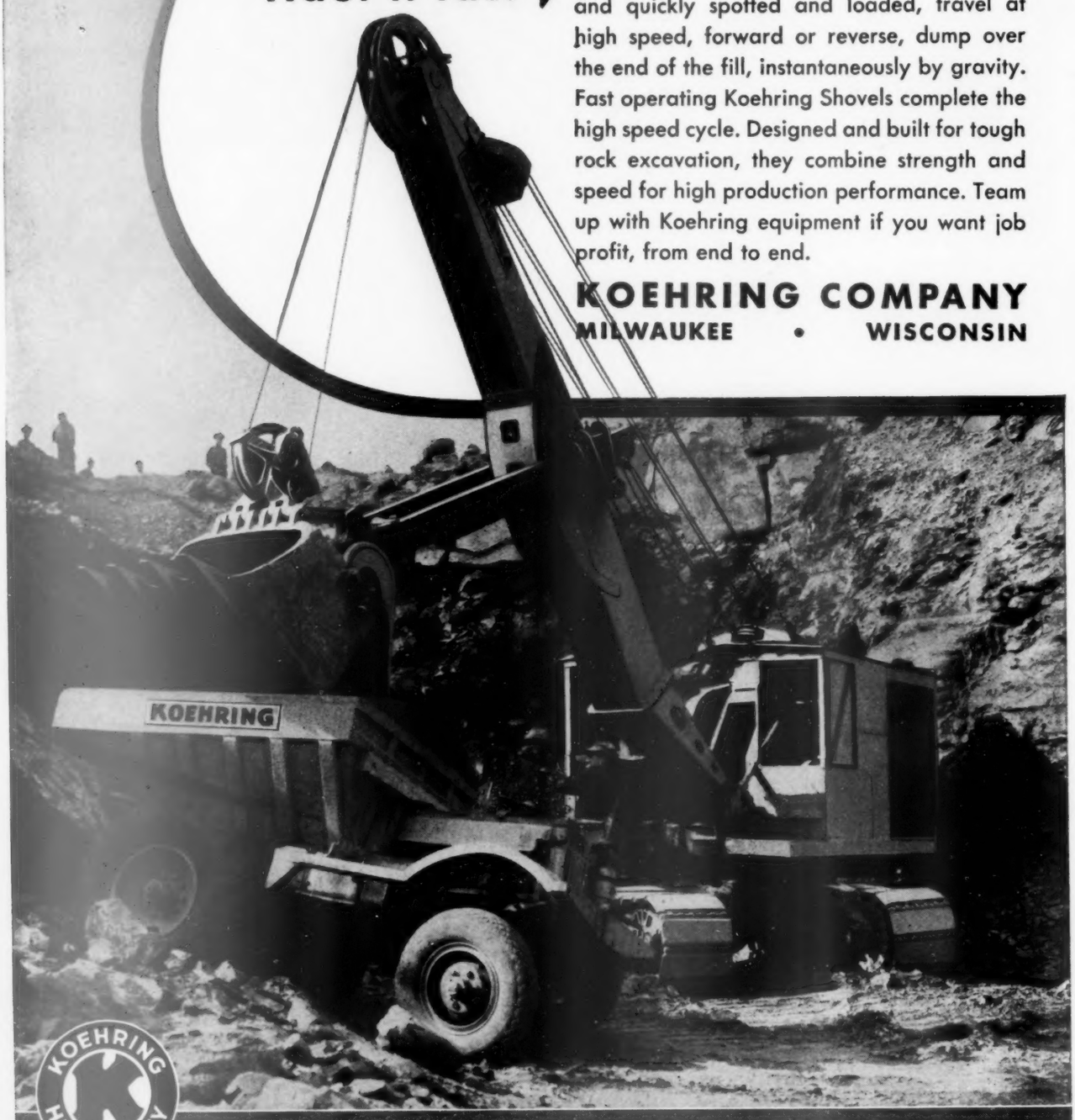
J & L—PARTNER IN PROGRESS TO AMERICAN INDUSTRY

# KOEHRING *Team-Work* FOR LOWER COSTS

**Dig it fast ▶**
**Load it fast ▶**
**Haul it fast ▶**

All three are necessary — if you want profit on your dirt or rock excavation job. Now you can have all three—with Koehring Dumptors and Koehring Shovels. Dumptors are easily and quickly spotted and loaded, travel at high speed, forward or reverse, dump over the end of the fill, instantaneously by gravity. Fast operating Koehring Shovels complete the high speed cycle. Designed and built for tough rock excavation, they combine strength and speed for high production performance. Team up with Koehring equipment if you want job profit, from end to end.

**KOEHRING COMPANY**
**MILWAUKEE • WISCONSIN**




KOEHRING HEAVY DUTY

**HEAVY-DUTY CONSTRUCTION EQUIPMENT**

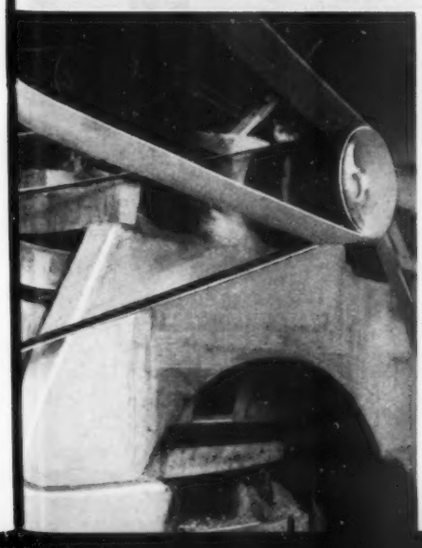
# THIS IS WHAT CHALLENGER TRANSMISSION BELTS ARE DOING

**Exacting Laboratory Tests Make Sure Republic Challenger Will Do the Same For You**

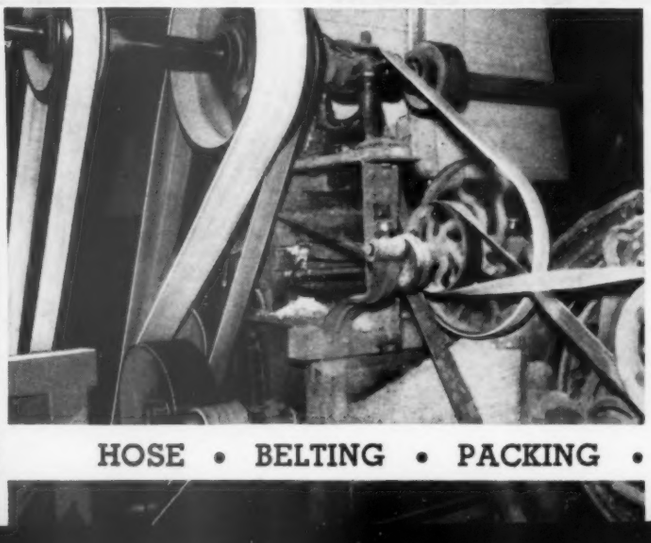
● Some of industry's most difficult drives . . . crushers, forging hammers, centrifugal pumps, line shafts, compressors, electrical generators, etc. . . . are belted with Republic's Challenger. Wherever the going is toughest—where heavy pull, shock starting and stopping, high speeds and rough wear demand the most of a belt—there you will find this tenacious, pulley-gripping Transmission Belt. Every scientific precaution is taken to maintain the high standard of quality and serviceability for which Challenger is noted. Your Republic Distributor is a reliable source of information on this and other Republic Belting. Republic Rubber Division of Lee Rubber and Tire Corporation, Youngstown, Ohio.

# REPUBLIC RUBBER

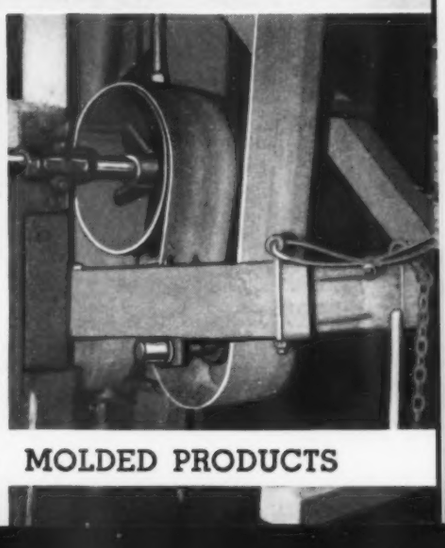
This crusher drive in a silica stone quarry presents severe service conditions for belting.



Challenger proves itself the ideal belt for small pulleys and sharp return bends on cotton-linting machine drives.



Cut-off saw drive in a sawmill, where intermittent service subjects belt to unusual strain and racking.



HOSE • BELTING • PACKING • MOLDED PRODUCTS

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- **Hundreds of new names; others checked and revised.**
- **Alphabetical by companies; geographical by plants.**
- **Consolidated catalogs of equipment makers.**
- **Revised and improved technical section.**

# JUST OUT . . . YOUR 1940 MAILING LIST...ORDER IT NOW!

## Don't Waste Your Time and Postage on an Old List

The compilers of the 1940 Directory Section of Pit and Quarry Handbook have labored painstakingly to build an accurate list of all known American producers of nonmetallic minerals. Each new listing has been carefully scrutinized for accuracy and completeness. Previous listings have been revised, checked, double-checked. All appear two ways—(1) alphabetical by companies, (2) geographical by plants. It gives you company names, officers, location of plants, size or capacity, and names of the men who do the buying. Select the complete Handbook *and* Directory, or the convenient, flexibly-bound Directory alone. Now ready for distribution. Order NOW to insure getting one of the first copies. Use coupon below . . . we'll bill you after you get the book.

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# DO YOU KNOW

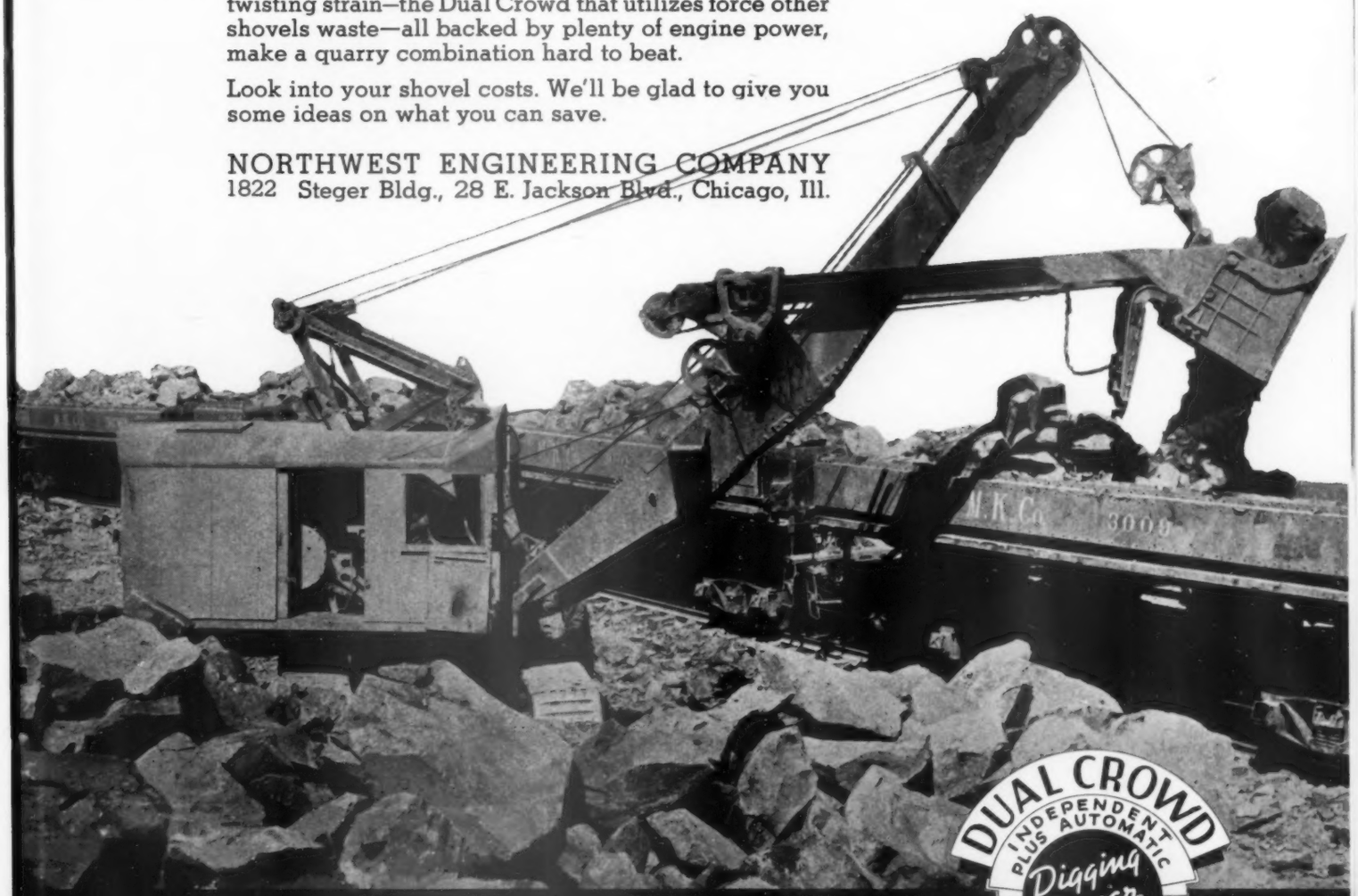
## What your Shovel costs you?

OR is shovel operation expense buried in pit costs? Bring it out in the light sometime and look it over—particularly if you are still depending on an old steamer. You may be surprised. Water, fireman, ashes, boiler tubes and grates mean money!

There are no standby charges on a gasoline, Diesel or electric shovel. When the engine stops, expense stops, and a modern Northwest machine will easily outdig your old steamer, or a new one for that matter. Northwests are real rock shovels, ruggedly built. A powerful welded boom (and no Northwest Welded Boom has ever failed)—Welded Dipper Sticks tied together at the inner end for greater resistance to twisting strain—the Dual Crowd that utilizes force other shovels waste—all backed by plenty of engine power, make a quarry combination hard to beat.

Look into your shovel costs. We'll be glad to give you some ideas on what you can save.

NORTHWEST ENGINEERING COMPANY
1822 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill.



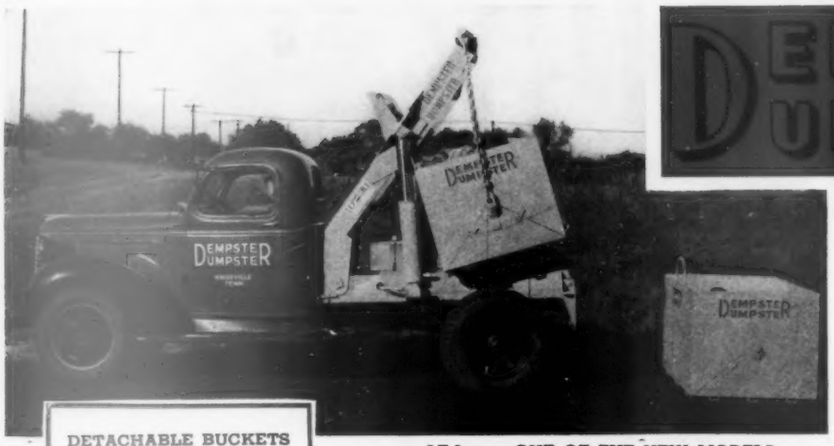

DUAL CROWD
INDEPENDENT PLUS AUTOMATIC
Digging Power Plus

Built in a range of 18 SIZES 3/8 yd. capacity and Larger

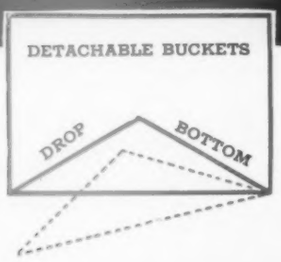
# NORTHWEST

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS • SKIMMERS

# DEMPSTER DUMPSTER




LF-2 . . . ONE OF THE NEW MODELS




- No High Pressure Hose
- No Counterweight
- No Auxiliary Jacks

Model LF-2, carrying either the detachable Drop-Bottom, Tilt-Type or Skip Bucket, has the center of gravity well ahead of the rear axle. Built in sizes for handling the heaviest materials up to and including 4 cubic yards and for lighter materials up to 6 cubic yards. Ask your dealer . . . or write us for facts proving that hand-loading costs can be reduced as much as 60 per cent!

From Maine to California, in Canada, South America . . . DEMPSTER DUMPSTERS are handling every type of material from rock to sand, from concrete to liquids. Built in a variety of sizes from 2 to 6 cubic yards capacity, one truck with a DUMPSTER and 6 to 10 detachable containers will do the work of several trucks at a saving up to 50 per cent. It's the "Payoff" in hand-loading! Get the Facts NOW!

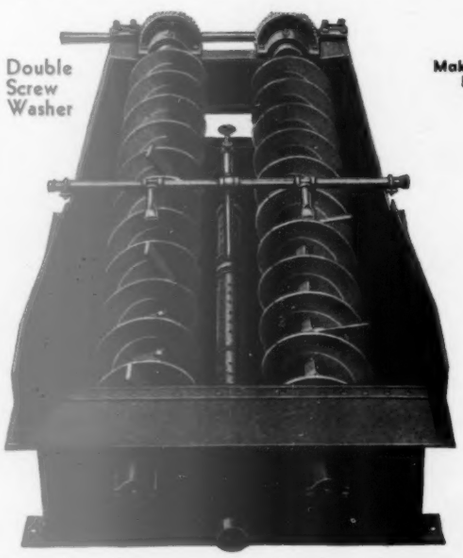
*Exclusive sales territory available for responsible dealers. Write for details.*

**DEMPSTER BROTHERS, Inc.** KNOXVILLE, TENNESSEE

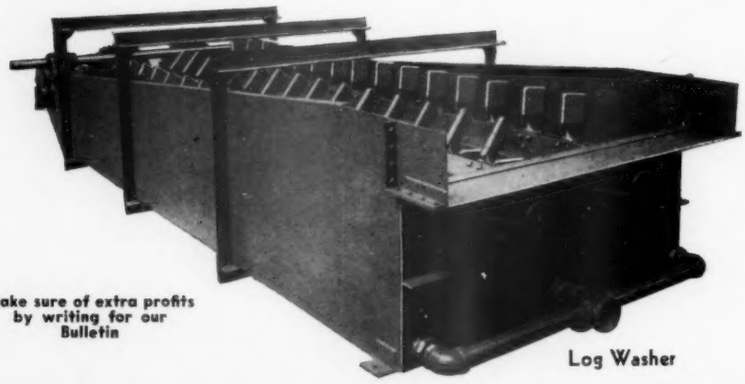
# EAGLE SAND and GRAVEL WASHERS Really Clean Up on the Job

EAGLE Washers have set the pace for many years in the sand and gravel industry. They are designed and constructed to do a quality job. Exclusive and patented features insure record operating economies, as attested by producers throughout the United States.

EAGLE Spiral Screw Washers are recommended for all material of lighter specific gravity than the aggregate. Furnished with single or double screw, and various diameters.



Double Screw Washer



Make sure of extra profits by writing for our Bulletin

Log Washer

Frequently washing problems are encountered where there is difficulty in breaking down refractory materials such as tough clays or conglomerates. EAGLE Paddle type Log Washers of proper length give complete satisfaction in handling aggregates of this description. They have also been used extensively in washing various ores.

Standard machine is Double Log type. We will quote on single log machine on application.

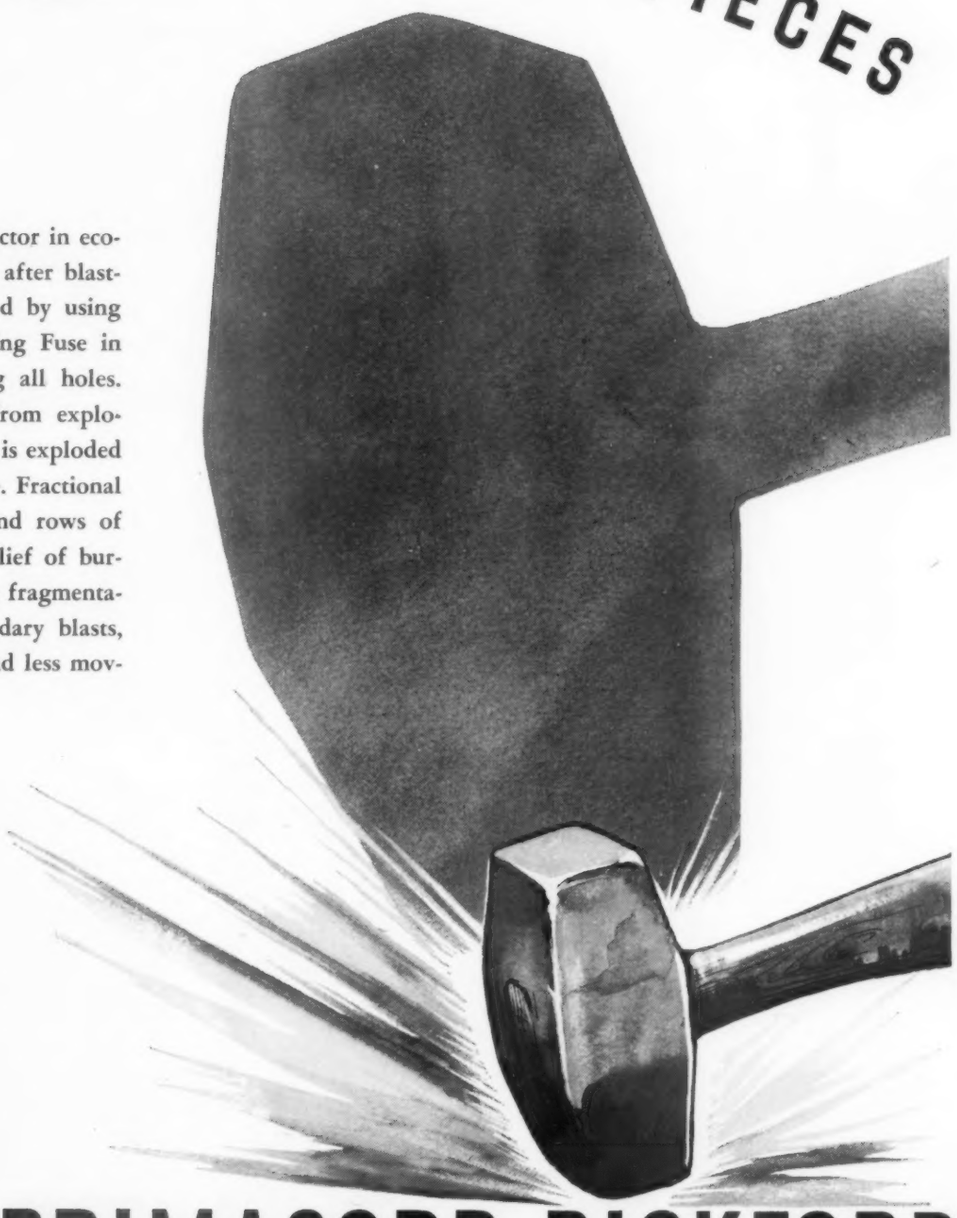
EAGLE Products have enjoyed an enviable—and deserved—reputation since 1872. They include: EAGLE Double Roll Crusher, Shale Planer, Sand Drag, Sand Tank, Dry and Wet Pans, Specialized Mining Equipment, Olsen Self-Dumping Cages, and the famous *Swintek* Chain Type Screen Nozzle Cutter which has revolutionized dredging operations.

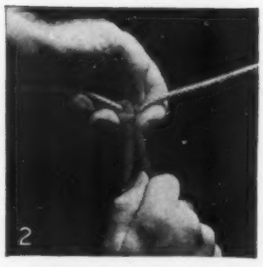
An investigation of EAGLE equipment will cost you nothing—and assure better operating profits.

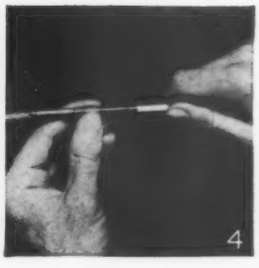
**EAGLE IRON WORKS** Des Moines, Ia.

# MORE *little* PIECES

*Little* pieces are a big factor in economical removal of material after blasting. Such economy is assured by using Primacord-Bickford Detonating Fuse in the holes and in connecting all holes. More power is developed from explosives, because every cartridge is exploded *directly* by this powerful fuse. Fractional time delay between holes and rows of holes also permits correct relief of burden. This results in excellent fragmentation, elimination of secondary blasts, easier removal of material and less moving of equipment.








## PRIMACORD·BICKFORD
## *Detonating* FUSE

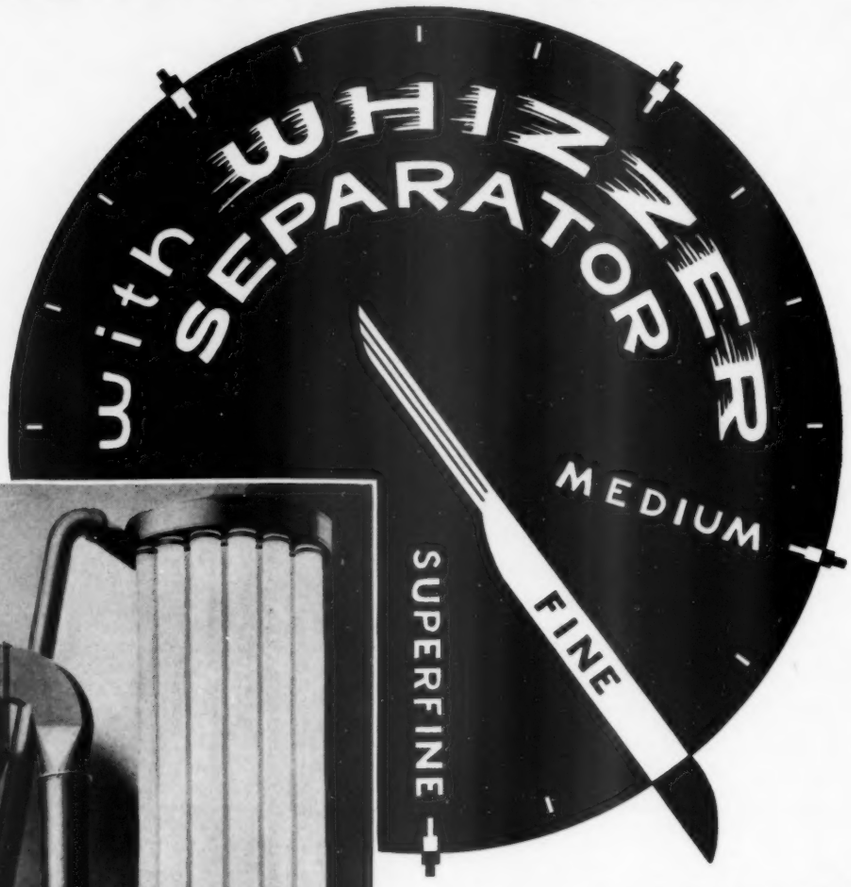
**THE ENSIGN-BICKFORD CO., Simsbury, Conn.**

*Makers of Cordeau-Bickford Detonating Fuse — and Safety Fuse since 1836*

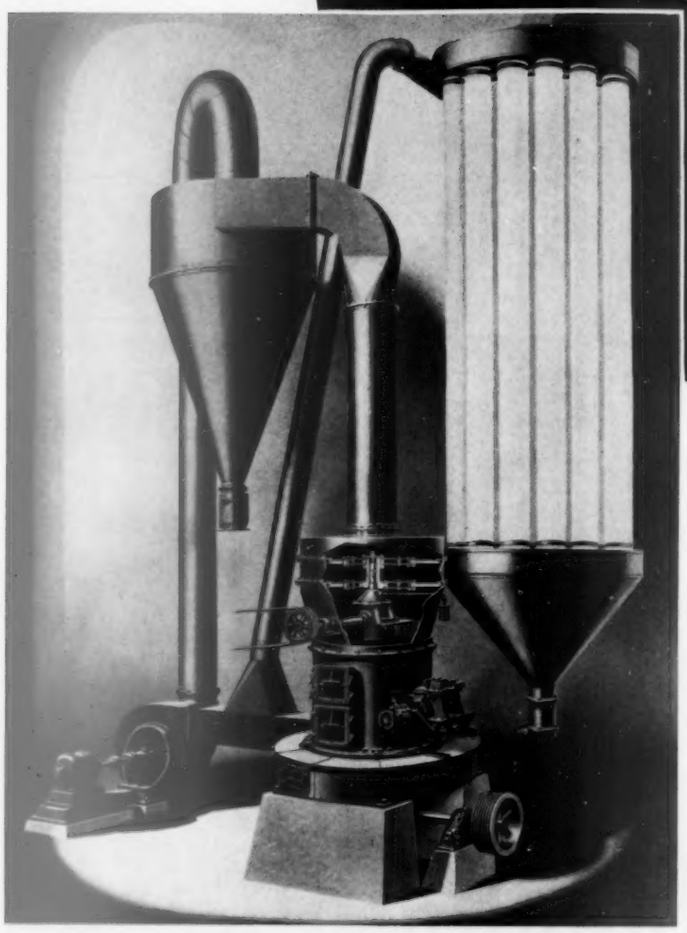
PB17

**1.** Tie through cartridge.
**2.** Half hitch branch to main line.
**3.** Connect main line lengths with square knot.
**4.** Fuse and cap on end of main line.

# *Raymond* ROLLER MILL • •




SINCE 1887



Detail of Raymond Roller Mill showing the revolving Whizzer mounted in the air separating chamber and driven through the variable speed transmission.

**This latest type of Raymond ROLLER MILL may be furnished with either a single or double whizzer, giving any degree of classification up to 99.99% through 400-mesh. By changing the variable speed control, the fineness can be regulated instantly while the mill is running.**

**The first advantage of the whizzer-type Roller Mill is the uniformity of the finished product. The second is economy of production, due to the high capacity obtainable per horse-power. For example, in grinding chalk whiting, output was increased from 1500 to 4000 lbs. per hour as a result of the whizzer separator. On limestone the increase averaged from 4¾ tons to 6¼ tons per hour, and on phosphate rock, production was raised 35 per cent.**

**Write for Catalog showing sensational performance of Whizzer-Type Raymond ROLLER MILLS.**

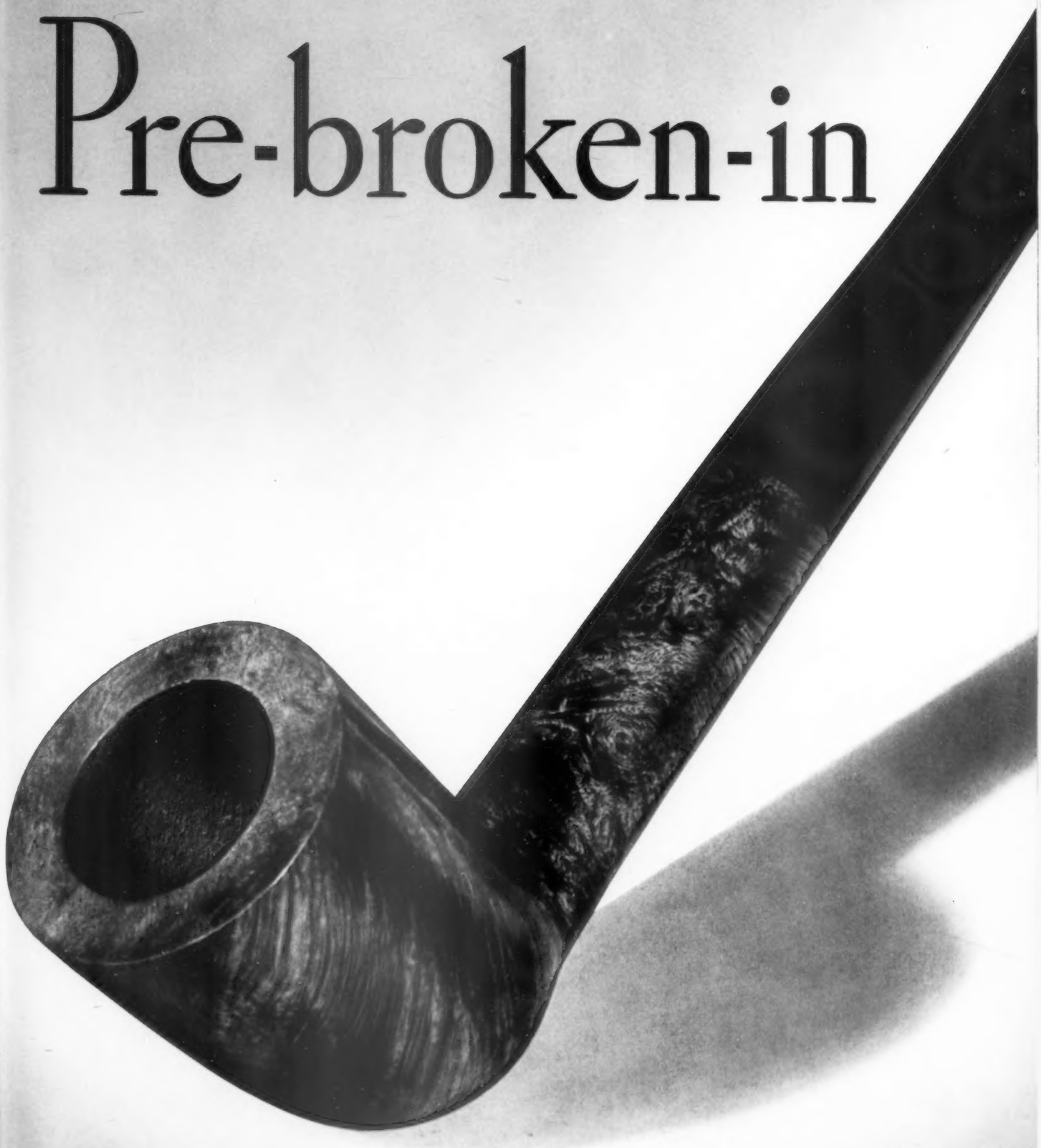
## RAYMOND PULVERIZER DIVISION

**COMBUSTION ENGINEERING COMPANY, INC.**

**1321 North Branch Street** **CHICAGO**

Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

# Pre-broken-in

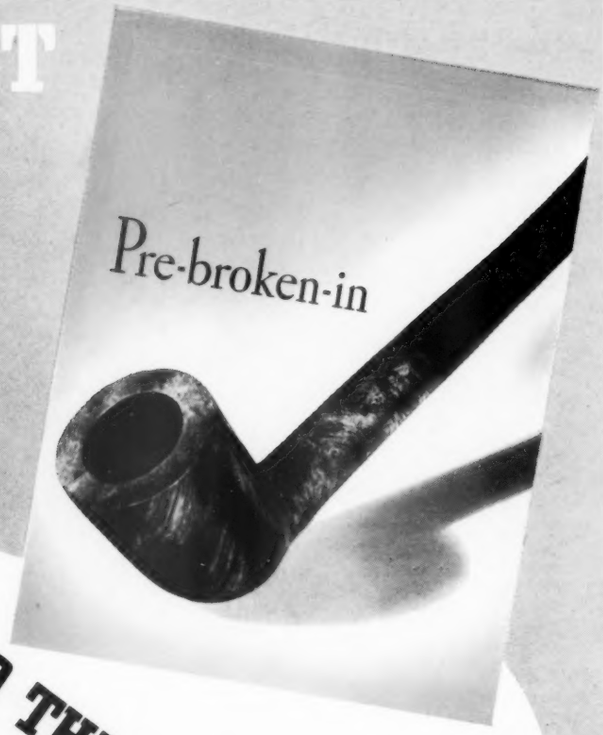


HAZARD WIRE ROPE

HAZARD LAY-SET PREFORMED

# HAZARD LAY-SET *Preformed*

## ...IS PRE-BROKEN-IN TO THE JOB



● When you put Hazard LAY-SET Preformed on the job there is no need to "baby" it until it is "broken-in." Hazard LAY-SET Preformed is preformed at the mill—pre-trained to the job.

Take this single example for instance. Closing lines on some clamshell buckets must take terrific beatings because of small sheaves and reverse bending. It is in such places that LAY-SET Preformed proves its merit right from the start.

LAY-SET has the stamina to endure the punishment *much* longer than ordinary wire rope. That means fewer shutdowns, fewer rope replacements, steadier production, greater profits.

Write today to the Hazard district office nearest you and ask for the name of your nearby Hazard distributor. He will show you how to effect real economies in your machinery operation. All Hazard ropes made of Improved Plow Steel are identified by the Green Strand—and Green Signifies Safety.

**HAZARD WIRE ROPE DIVISION**

*Established 1846*

**AMERICAN CHAIN & CABLE COMPANY, INC.**

**WILKES-BARRE, PENNSYLVANIA**

District Offices: New York, Chicago, Philadelphia, Pittsburgh, Fort Worth, San Francisco, Denver, Los Angeles, Atlanta, Tacoma

2M-PQ-R

HAZARD WIRE ROPE

# Loading 5 cu. yd. trucks in RECORD TIME!

A 1 cubic yard MARION SHOVEL working in the quarries of Elmhurst-Chicago Stone Co.

When Elmhurst-Chicago Stone Company added the Leslie Gravel and Stone Company, Leslie, Illinois, to its active property holdings, it immediately started modernization proceedings. One of the first steps was to install a MARION Type 342 - 1 cu. yd. shovel. Its record speaks for itself. Put a MARION in rock or any hard going and it will repay you with big yardage and low operating cost. Make your next shovel a MARION . . . from ¾ cu. yd. up in size and capacity.

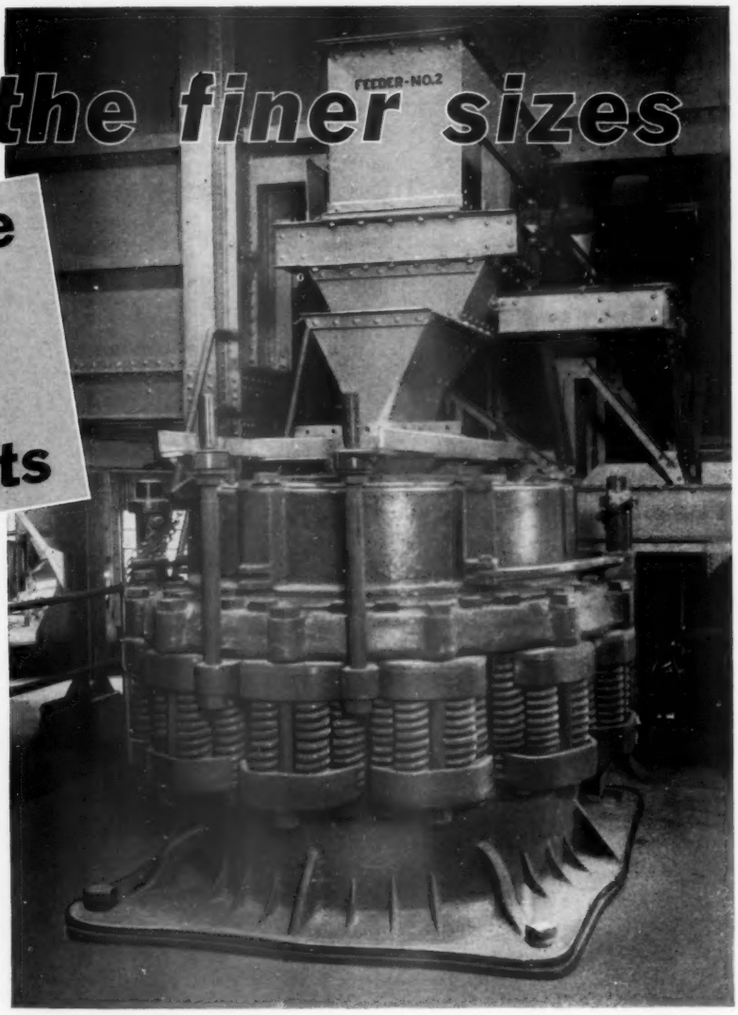
THE MARION STEAM SHOVEL CO. MARION, OHIO, U. S. A.

# MARION

SHOVELS · DRAGLINES · CLAMSHELLS · CRANES · WALKERS

# Producing the finer sizes

## Greater Tonnage ★ Lower Costs ★ Increased Profits




Four foot Short Head Cone used for making a minus ¼ inch limestone product.

## Making minus 3/16 to ½ inch material in quantity

is best accomplished with the Symons Short Head Cone Crusher as evidenced by the many recent installations among the larger producers of crushed stone, gravel and slag. Its great capacity provides increased output of finer sizes for which there is a constantly growing demand. Its low crushing cost means greater profits. Compare the Cone with any other reduction crusher and note its unusual construction to meet the heavy duty service encountered in fine crushing. Such features as steel construction for all major parts, bronze bearings throughout, pressure lubrication, spring protection against tramp iron damage, all contribute to better performance, lower maintenance and longer life.

If your present equipment will not do your finer crushing economically, investigate the merits of Symons Cone Crushers. The full line of Standard and Short Head Cones will assure a solution of that difficult fine crushing problem.

**NORDBERG MFG. CO.** MILWAUKEE, WISCONSIN

NEW YORK 60 E. 42nd St. | LOS ANGELES Subway Term. Bldg. | TORONTO Concourse Bldg. | LONDON Bush House

# SYMONS CONE CRUSHERS

PIT AND QUARRY

Vol. 32 February, 1940 No. 8

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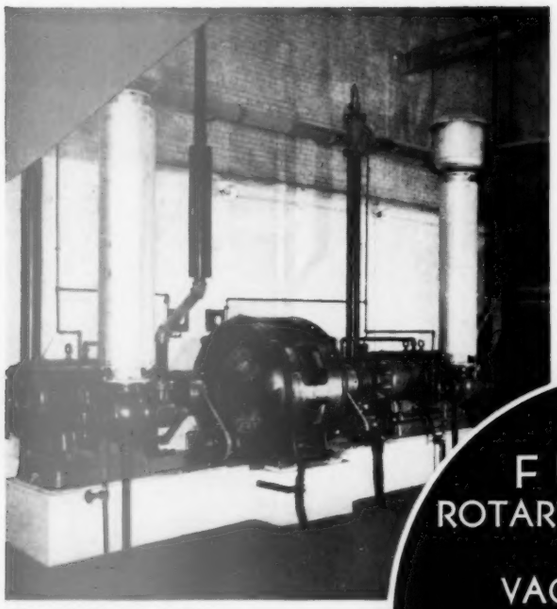
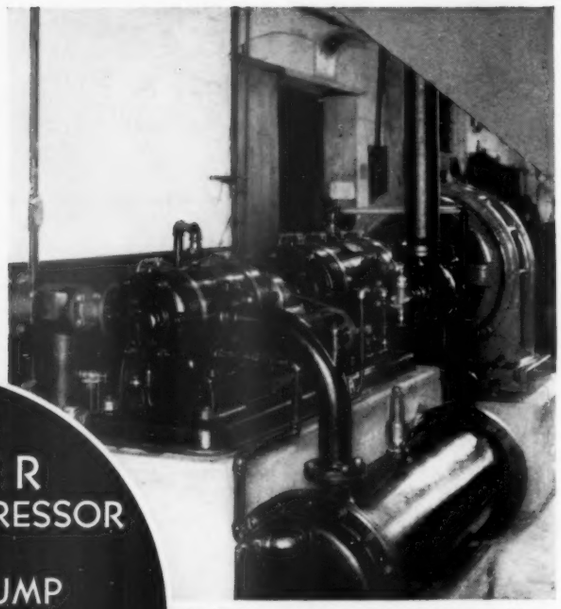


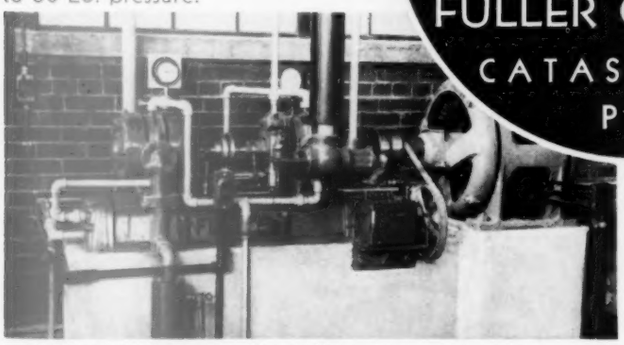


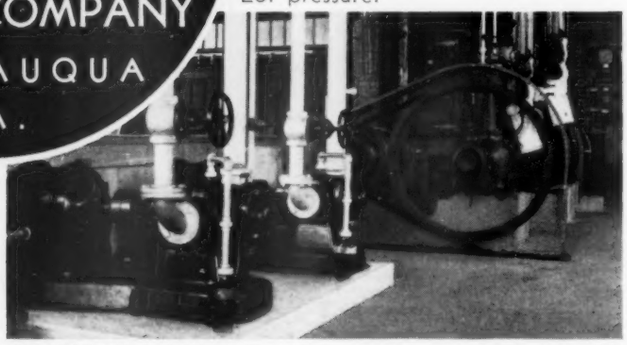
TYPICAL
FULLER
ROTARY COMPRESSOR
AND
VACUUM PUMP
APPLICATIONS

FULLER COMPANY
CATASAUQUA
PA.

**CEMENT PLANT** — Single-stage, duplex unit, common motor drive, capacity better than 2200 c.f.m. up to 30 Lb. pressure.

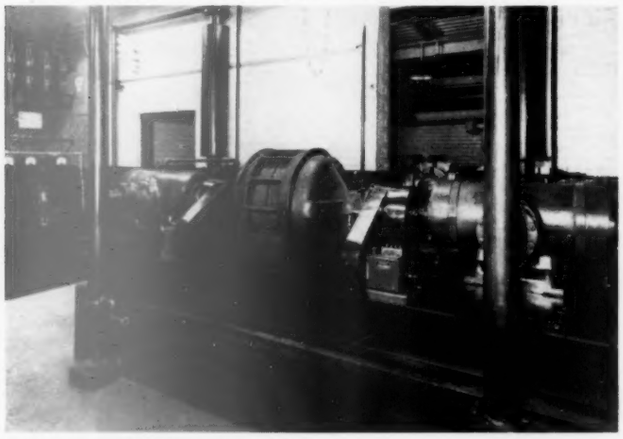
**AUTOMOBILE TIRE PLANT** — Two-stage Compressor, capacity 388 c.f.m. actual free air delivery, 110 Lb. pressure.

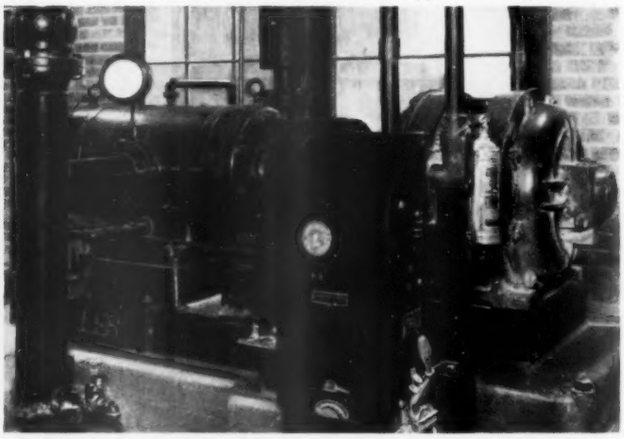




**PATENT FASTENER PLANT** — Two-stage Compressor, capacity 100 c.f.m. actual free air delivery, 90 Lb. pressure.

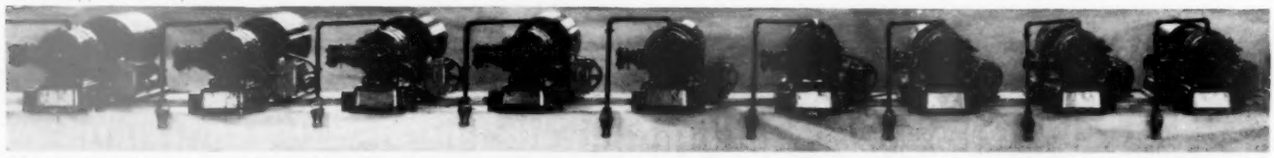
**ICE PLANT** — Two Single-stage Compressors, capacity each 100 c.f.m. actual free air delivery, 17 Lb. pressure.





**GAS & FUEL PLANT** — Single-stage, duplex unit, common motor drive, capacity 750 c.f.m. actual free air delivery, 37 Lb. pressure.

**GAS & FUEL PLANT** — Single-stage Vacuum Pump, capacity 500 c.f.m. at 25 inches of vacuum.



Nine of a shipment of twelve Single-stage compressors installed in United States Post Office Building, Washington, D.C., for use in connection with sewage ejectors. C-38

PIT AND QUARRY

CHICAGO

FEBRUARY, 1940

## Valley Forge Cement Plant Being Modernized

### ADDING TO FLOTATION SYSTEM

The plant of the Valley Forge Cement Company, at West Conshohocken, Pennsylvania, was shut down, on January 1, for the purpose of completing an extensive modernization program. The principal improvements will be made in three departments. Preliminary crushing and air-separator equipment is being installed in the finishing department to improve fineness and insure higher surface areas. Changes are being made in the kilnroom to improve operating conditions and reduce fuel consumption. Modifications of the flow-sheet and additions to the equipment of the flotation plant will enable the plant to meet the present and proposed specifications for low-heat, sulphate-resistant and other special cements. In general the new flow-sheet is designed to recover both quartz and calcite, but to discard alumina- and magnesia-bearing minerals, in various proportions to satisfy the composition requirements for all types of cements. It is expected that these improvements will be completed by March 15, 1940.

## Predict First Quarter Car Loading Increase

A nationwide increase of 10.2 per cent. in car-loadings of gravel, sand and stone is expected during the first quarter of the current year over the corresponding 1939 period, according to estimates compiled by the 13 regional shippers' advisory boards and made public by the Association of American Railroads.

It is indicated by the estimates that freight car loadings of gravel, sand and stone will total 178,299 during the initial quarter this year, as compared wth 161,787 actual carloadings in the same period last year.

During the same period the carloadings of cement are expected to reach 88,971, an increase of 6.4 per cent. over the 83,652 in the first 1939 quarter.

**1940 HANDBOOK NOW AVAILABLE**

The thirty-third edition of ***Pit and Quarry Handbook and Directory*** has just come off the press. Completely revised to conform with present-day operating methods, the technical reference section presents an authoritative "short course" in prospecting, plant design, and production.

The Directory Section has undergone painstaking revision, hundreds of new names being added and all listings have been revised and checked for accuracy.

Producers listed in the Directory Section will shortly receive their copies, mailed by the publisher without charge. A charge of $10.00 per copy is made to others.

Carloadings of lime and plaster, on the basis of the estimates, will total 32,296 in the first quarter this year, an increase of 11.7 over the corresponding 1939 period.

## Nicaragua Now Buying Cement Made in U. S.

Large quantities of cement are being imported by Nicaragua from the United States for the first time in many years. Engineers say that considering the quality and the time saved in shipping, American cement is better and cheaper in the long run. Formerly German, Swedish, and Belgian cements were used.

A ship-load of talc, consigned to London, England, by the Sierra Talc Company, Los Angeles, was sunk by a German mine according to reports recently received at the company's plant at Keeler, California.

Other shipments, still being made, are said to be arriving safely.

## Apportion $156,000,000 Federal Highway Fund

### TO REMOVE GRADE CROSSINGS

Federal Works Administrator John M. Carmody has apportioned among the 48 states, the District of Columbia, Hawaii and Puerto Rico, $156,000,000 for highway improvement and elimination of hazards at railroad grade crossings, available from appropriations authorized for the fiscal year beginning July 1, 1940, after deductions of amounts authorized for administrative expenses.

The apportionment was authorized by the Act of June 8, 1938, which provided $115,000,000 for improvement of the Federal-aid system and its extensions through cities, $15,000,000 for improvement of secondary or feeder roads, and $30,000,000 for elimination of hazards at railroad grade crossings.

## *Coming Events*

*February 12-13, 1940 — New York, N. Y.* Annual convention, Sand-Lime Brick Association, Pennsylvania Hotel.

*February 12-14, 1940—Washington, D. C.* Annual conventions, National Concrete Masonry Association and Cast Stone Institute, Mayflower Hotel.

*February 15-17, 1940 — Chicago, Ill.* Thirty-third annual convention, American Concrete Pipe Association, Palmer House.

*February 27-29, 1940—Chicago, Ill.* Thirty-sixth annual convention, American Concrete Institute, Palmer House.

*May 7-9, 1940—Cincinnati, O.* Annual convention, National Concrete Burial Vault Association.

# CURRENT BUSINESS INDICATORS

Business activity early in January advanced somewhat from the customary slump during the Christmas holiday period but the month as a whole was probably below December. This decline was not unexpected for the December index of the Federal Reserve Board, adjusted for seasonal variation, was about 128, the highest level in the history of the series. Government and business forecasters have predicted a moderate spring set-back with a new advance later in the year. These predictions are based largely on the domestic situation, although the war, of course, is still a dominant factor in the business picture.

Of particular significance to producers of nonmetals were the statements of Edward J. Harding, general manager of Associated General Contractors of America, and F. W. Holden vice-president of the F. W. Dodge Corporation. Mr. Harding predicted increased business and employment in construction in 1940. He expects an appreciable increase in Federal national defense projects and in private building, as well as a definite shift from Federal to local public works. Mr. Holden also estimates that there will be an advance in construction in 1940. He bases his conclusion on predicted increases of 17 per cent. in commercial building, 37 per cent. in manufacturing, and 15 per cent. in residential, accompanied by declines of 16 per cent. in other non-residential building and 15 per cent. in public works and public utilities.

**COMMERCIAL PRODUCTION AND RAILWAY SHIPMENTS OF SAND AND GRAVEL AND CRUSHED STONE, 1928-38**

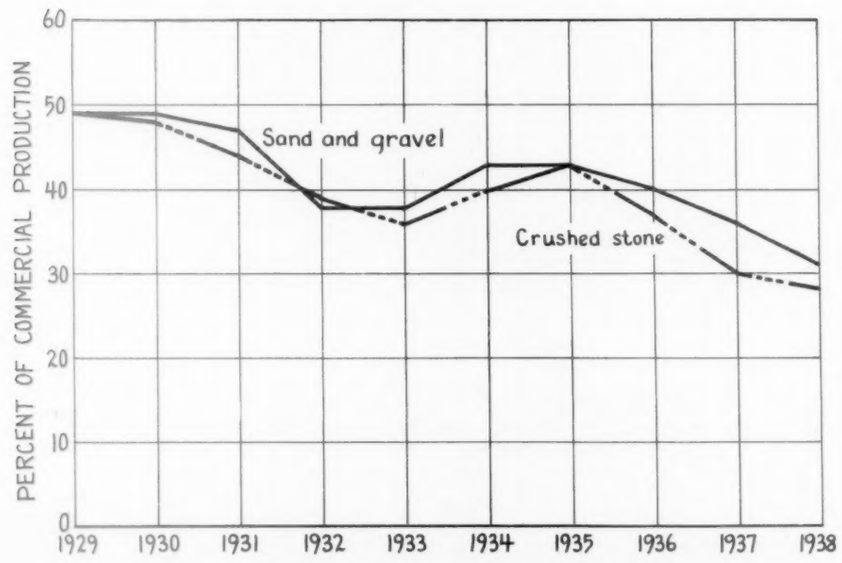
| Year | Sand and Gravel | | | Crushed Stone | | |
|---|---|---|---|---|---|---|
| | Production[1] (*short tons*) | Railway Shipments[2] (*short tons*) | *Percentage* | Production[3] (*short tons*) | Railway Shipments[2] *Short tons* | *Percentage* |
| 1929 | 166,962,827 | 81,408,069 | 49 | 68,862,770 | 33,529,078 | 49 |
| 1930 | 150,981,218 | 73,983,841 | 49 | 66,743,090 | 31,826,800 | 48 |
| 1931 | 114,279,328 | 53,562,437 | 47 | 58,005,520 | 25,860,716 | 45 |
| 1932 | 75,160,409 | 28,764,827 | 38 | 39,309,650 | 15,348,182 | 39 |
| 1933 | 56,957,386 | 21,818,258 | 38 | 33,205,710 | 12,034,918 | 36 |
| 1934 | 64,202,016 | 27,683,404 | 43 | 37,935,730 | 15,676,023 | 41 |
| 1935 | 70,956,843 | 30,451,218 | 43 | 32,823,650 | 14,135,260 | 43 |
| 1936 | 100,414,290 | 40,213,215 | 40 | 49,560,350 | 18,578,407 | 37 |
| 1937 | 103,852,482 | 37,546,068 | 36 | 54,154,680 | 16,901,328 | 31 |
| 1938 | 92,349,743 | 28,383,925 | 31 | 54,278,200 | 15,283,912 | 28 |

[1] Bureau of Mines; excludes government and contractor production, glass sand, molding sand, and railroad ballast.
[2] Interstate Commerce Commission; revenue freight originated.
[3] Bureau of Mines; excludes government and contractor production and railroad ballast.

The only information available at this time of the year directly relating to movements of aggregates in 1939 is the record of railroad shipments compiled by the Interstate Commerce Commission. Figures for three-quarters of the year have been released and they show an increase of 3 per cent. for sand and gravel and 5 per cent. for crushed stone over the comparable period of 1938. These increases lose their direct significance when considered in their relation to the record of the past few years, for the quantity of aggregates moved by railway has dropped steadily. In 1929 49 per cent. of sand and gravel and also crushed stone was shipped by railway, but by 1938 only 31 per cent. of the sand and gravel and 28 per cent. of the stone was moved in this manner. If this trend continued into 1939 it is entirely conceivable that the relatively small increases in railway shipments might well represent increases in actual output of 10 to 15 per cent.

Throughout the business advance in the closing months of 1939 repeated warnings regarding unwarranted increases in inventories were widely circulated. The general impression was that business was preparing for war orders that largely failed to materialize and huge stocks of virtually all commodities were being built up. Records now indicate that actually there does not seem to have been an excessive inventory accumulation at any time.

Wholesale stocks late in the year were about 4 per cent. above the low point in the summer and 6 per cent. above 1938. Manufacturing inventories were less than 4 per cent. above the low of the year and the average of the previous year. Department-store stocks were only slightly higher than at the end of 1938 and with retail trade in the last quarter of 1939 reaching the highest level in nearly a decade any concern over inventories would seem to relate to their inadequacy. Some adjustment of inventories to higher levels seems like a reasonable move for manufacturers as well as retailers for protection against shortages. If this is done conservatively in relation to increased demand no harm is likely to result. On the other hand, if excessive inventories are built up in anticipation of higher prices and prospects of fat profits the entire business structure may well be endangered.




Changes in proportion of commercial and other production of aggregates, 1929-1938.

## Road Show and Exhibit Are Largest in History

### 37 COUNTRIES REPRESENTED

Visualize 25,000 people, and you get some idea of the extent, the enormity of the 37th annual Convention and Road Show of the American Road Builders' Association, held in Chicago's International Amphitheater, January 29 to February 2. The 1940 Road Show was the largest ever presented. Approximately 25,000 delegates, representing all of the United States and 36 foreign countries, attended the convention. The Road Show, 20 per cent. larger than ever before, embraced nearly 8 acres of floor space.

A significant phase of the A.R.B.A. Road Show-Convention was the emphasis placed on county road-building activities. Among the technical reports addressed to county road builders were a discussion of *Tarbound Gravel Mixes*, by C. L. Hanson, Kane County Highway Superintendent, Geneva, Illinois, and an address on *Soil Stabilization with Tar*, by Ralph Witt, St. Joseph County Highway Supervisor, South Bend, Indiana.

Other highlights of the Road Show-Convention which had particular interest for the producers of aggregates included a luncheon-meeting of the Highway Contractors' Division. A *resumé* of the developments of contractors' equipment was presented in a novel fashion at this session. The presentation covered grading equipment and methods; concrete paving, including batching and hauling of aggregates, fine grading, mixing and form setting, placing and finishing; bituminous operations, including stationary plants, traveling plants and spreading and compacting, and brick paving, including modern equipment for brick pavements. Bert Myers, engineer of materials, state highway commission, Ames, Iowa; F. V. Reagle, engineer of materials, state highway department, Jefferson City, Missouri; and E. C. Welden, deputy state highway commissioner, Hartford, Connecticut, contributed to a discussion of *Placing Concrete by Vibratory Methods* at the joint equipment session. *The Use of the Screw Conveyor in Placing Pavement Concrete* was discussed by Lion Gardiner, vice-president, Jaeger Machine Company, Columbus, Ohio. H. F. Clemmer, engineer of materials, District of Columbia, Washington, who presided at the joint equipment session, spoke on *The Design of Concrete Bases* at the municipal officials' session. Speakers at the general technical sessions included Samuel W. Marshall, chief engineer, Pennsylvania Turnpike Commission, Harrisburg, Pennsylvania, on *Design and Construction of the Pennsylvania Turnpike* and W. R. Macatee, district engineer, Asphalt Institute, Washington, D. C., on *Asphaltic Base Construction*. The newly formed Airport Division heard Professor William S. Housel, research consultant, Michigan State Highway Department and professor of civil engineering, University of Michigan at Ann Arbor, discuss *Important Considerations in Airport Construction*. A special meeting of the Committee on Pavement Joints had C. N. Conner, senior highway design engineer, Public Roads Administration, Washington, D. C., as presiding officer.

The opening A.R.B.A. convention session featured addresses by Mayor Edward J. Kelly of Chicago; Murray D. Van Wagoner, A.R.B.A. president; Oklahoma Congressman Wilburn Cartwright; Thomas H. MacDonald, commissioner, Public Roads Administration, Federal Works Agency; and Henry F. Cabell, president, American Association of State Highway Officials.

It has been established that more than 100,000 miles of our primary road system are obsolete. Road construction has grievously failed to keep pace with automotive output. The majority of today's roads were built for the vehicular traffic of yesterday. Over 30,000,000 motor vehicles, one for every four Americans, swarm our roads and streets. Charles M. Upham, A.R.B.A. engineer-director, prophesies that 10,000,000 more automobiles, trucks and buses will be added to this gigantic total within the next ten years. The most authoritative automotive experts maintain that American vehicular traffic will double by 1960. There is no escaping the fact that master highways must be constructed, not only to solve to-day's congestion problem but to accommodate the future's increased flow of traffic.

A subject of paramount interest to highway administrators, planners and builders alike at the convention was the discussion of the national highway-planning survey by officials of the Public Roads Administration. This survey is being undertaken by the administration in coöperation with 46 states and the District of Columbia. It has been revealed through the survey that the nation critically needs a system of interregional roads, linking centers of commerce and population.

Another agency of federal government that is profoundly interested in highways is the War Department. There are no military roads in the United States. Highways designed and built for peace-time pursuits will also serve the purposes of national defense in the event of an emergency. Highways are essential to the success of defense maneuvers and movements.

(*Continued on page 57*)

## 1939 Building Volume Largest Since 1930

### INCREASE LARGELY PRIVATE

The year 1939 had the largest total construction volume since 1930 and the largest residential building volume since 1929, according to F. W. Dodge Corporation in a statement making public the final figures for the year on construction contracts awarded in the 37 eastern states. The 12-month total for all building and engineering work was $3,550,543,000, compared with $3,196,928,000 in the preceding year. Of the $353,000,000 increase, $350,000,000 was in privately financed construction.

Most important, both in magnitude and as an indicator of widespread increases in the number of new investments in buildings, was the increase in residential building, from $985.787,000 in 1938 to $1,334,272,000 in 1939. This increase amounted to 35 per cent. The $348,000,000 of dollar increase included increases of $244,000,000 in private residential building and $104,000,000 in publicly financed residential buildings, the latter consisting principally of subsidized housing under the U. S. H. A.

An increase of $49,000,000. or ten per cent., in private non-residential building was more than offset by a decrease of $156,000,000 in publicly financed non-residential building. The result of these opposing trends was a 10 per cent. reduction of the non-residential total, from $1,072,137,000 in 1938, to $965,638,000 in 1939. Heavy engineering contracts (for public works and utilities projects) increased 10 per cent., from $1,139,004,000 in 1938 to $1,250,633,000 in 1939. The $111,000,000 increase was practically evenly divided between publicly financed and privately financed projects.

## Dust-Collectors Added By Many Producers

The Staso Milling Company is installing a Sly continuous automatic dust-filtering system at its crushed-stone and roofing-granules plant at Kremlin, Wisconsin. The equipment is capable of handling 33,000 cubic feet of dust-laden air per minute.

A number of plants in foreign countries have also recently installed Sly dust-control equipment. These included one of the Lone Star Cement Corporation's Argentina plants; the Peruvian Portland Cement Company at Lima, Peru; and the Nederlandseh-Indische Portland Cement Maatschappij at Amsterdam, Holland.

# EDITORIAL

## *Work for the Social Scientists*

OF all ages, this surely is the age of science. To every form of activity the laws of physical science have been made to yield the fruits of our growing understanding of them. Industry, the form of activity that characterizes more than any other the age in which we live, is indebted to physical scientists far beyond common belief. And the field of economics, in so far as it has been shaped by modern industry, has felt, too, the advancing stride of science, for capitalism, the highest known form of profitable industry, would be impossible without the helping hands of science.

Physical science and the physical scientists have given us what we know and what we enjoy in our modern machine economy. No demand for the necessities or comforts of life, as we know them, was too great for the exponents of the physical sciences. Markets grew rapidly through increases in population and the opening and colonization of undeveloped lands. Rising demands for food, clothing, shelter and the other requisites of living required new methods of production. They could no longer be met by the day-to-day production schemes of home industry. Physical science came to the rescue by providing newer, faster and cheaper means of production. It gave the machine and the factory, which provided the increased output, the greater variety, which growing needs required. And this new form of production needed new forms of transportation, for it would have been unavailing to have transferred production from millions of homes to thousands of factories without providing the means for transporting the products of those factories to the homes where they had formerly been made. For this task, also, science provided the technique and the facilities.

And when increased demands for goods of all kinds called for the greater application of human labor, science was ready with machines for quantity production. The tendency of an increased demand for labor to raise the wages of labor was checked by the readiness of science to offer production methods that required less and less labor per unit of output. The service which science rendered to industry was not unappreciated even a century ago. Dr. Andrew Ure, Scottish chemist and a keen observer of conditions in his time, writing in his *Philosophy of Manufactures* in 1835, said of the self-acting mule used in the spinning industries that it was "a creation destined to restore order among the industrial classes". He added that it "confirmed the great doctrine already propounded, that when capital enlists science into her service, the refractory hand of labor will always be taught docility".

In the present economic situation, in which we find great productive power and capacity only partially utilized because millions of unemployed persons can not buy the output of the thousands of factories that stand ready to serve them, it is doubtful whether the ability of science further to reduce the need for human labor or further to enlarge the output of automatic machinery will be in as great demand. A manufacturer who, because of lack of demand, can sell only 1,000 articles of a given kind is not likely to become enthusiastic about possible means for multiplying his output tenfold without adding to his labor force. The farmer who has an unmarketable surplus of agricultural produce can not be expected to show much interest in mechanical means for doubling or trebling his crops. The march of science in the field of industrial production has been slackened somewhat by the realization that highly advanced technology can not earn its maximum profits unless markets have been devoloped at a faster or, at least, an equal rate. The physical scientists appear to have outrun the social scientists.

DURING the low point of the last economic crisis the policy of placing a restraining hand on further scientific development was widely discussed. It was reported that in a secret session of an organization of American engineers a proposal to close the United States Patent Office for a century had been seriously debated as the only worth-while contribution which the engineering profession could make to the solution of the economic problems of the period. Lecturing on the world crisis in London in 1932, Joseph Caillaux, formerly French minister of finance and a widely accepted authority on economic problems, said in part: "At the present time, an urgent task is to stop this war of technical appliances, but it, too, is a difficult problem. First of all, I must destroy any illusions you may have. It is purely chimerical to imagine that time will cure all and that producers themselves will moderate the application of scientific discoveries to industry; even if they wished to, they could not do this. We must realize that the authorities must be called upon to intervene. Employers, financiers, and merchants will have to be compelled to coöperate in the home markets of their own countries and later beyond their frontiers, to get together to adapt production to consumption, to coördinate their forces, to unite, to rationalize, if this barbarism is preferred, their technical appliances. But this must be carried out in such a manner that individual enterprise, which will always be the great motive force in human progress, does not become less, in such a manner that the public authorities do not exceed the

scope of the only part which is theirs to play, that of encouraging and controlling."

Along with the remarkable advances made in industrial productivity by the practical appliers of the laws of physical science have come great changes in social life. Some of these are the inevitable results of the changes made in economic life. The increasing use of labor-saving machinery has undoubtedly been the chief factor in the world-wide spread in unemployment. Although as recently as 1910 it was possible for the Committee of the Eugenics Society of England to say that "the unemployed represent relatively weaker stocks", modern sociologists do not often ascribe the unemployment of millions of persons to congenital abnormalities. Biologists of this day, unless coerced by government pressure, would be slow to agree with the committee that the poor are poor because of hereditary defects. Class distinctions are coming to be based more and more on economic qualifications and less and less on biological antecedents. If present trends are continued, more and more people will be dependent for the necessities of life on the contributions made by fewer and fewer people, whether through charity or social-security taxation methods.

Until within the last two centuries at the most man's chief struggle had been with the forces of Nature. His inability to withstand successfully the superior powers with which he had to contend, his sense of weakness in the presence of phenomena which he did not understand, the uncertainty of his existence, the irregularity in the supply of his food, the hardships involved in trying to extract a living from the soil, the apparent need for wheedling help from the spirits which he invented for every force that seemed to oppose him—these made him the victim of his environment. Scientific discoveries and the practical application of them to every-day problems gave him his first sense of power, enabled him to cast off his humility. They made him to such an extent independent of his environment that he came to think himself master of it. But this is true to only a limited extent, for he had reckoned with only a portion of that environment. He had studied and successfully overcome his sense of physical danger, he had conquered his fear of the formerly unknown, but he had overlooked his most formidable enemy, his fellow man. He had been so preoccupied in the conquest of physical forces, and he had flattered himself so greatly on the importance of his accomplishment, that he had failed to realize that the formidable forces confronting him were psychological as well as physical.

IN this age we begin to see something of the one-sided nature of man's advance. It has been made chiefly along material lines, while his development on the psychic side has lagged far behind. Man has contrived the means for providing a sufficiency of all the elements necessary for comfortable living but he has failed to provide means for their proper distribution and enjoyment. Despite the most ingeniously-devised machines for the production of good commodities in large quantities at low prices; despite, too, the availability of the needed raw materials in seemingly inexhaustible quantities; despite, furthermore, urgent need for those commodities in ever-increasing amounts by a populace long reduced to short rations—despite all these circumstances favoring the maintenance of a stable and prosperous economy, we find misery, hardship and starvation in the midst of plenty.

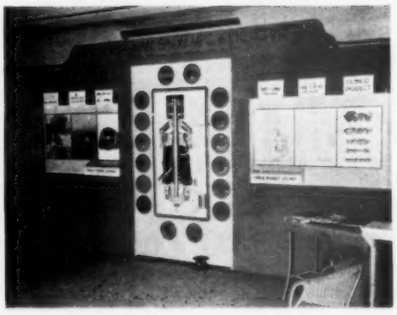
THE experts in physical science have been pressed into our service for a long time. They continue to serve us, to startle us, with their innovations. The time has surely arrived when we are justified in calling on our experts in the social sciences for help in bringing man's political and economic development abreast of his physical. They must have something to say about the means that could be adopted to prevent this one-sided development from becoming an even more brutal struggle between man and man, class and class. Not until men have learned to understand society itself can they be expected to know what constitutes antisocial action.

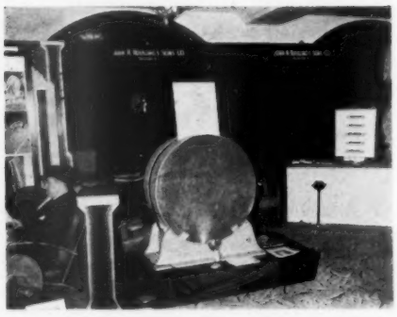
The founder of the science of psychoanalysis, Sigmund Freud, had something to say on this subject in *The Future of an Illusion,* when he wrote:

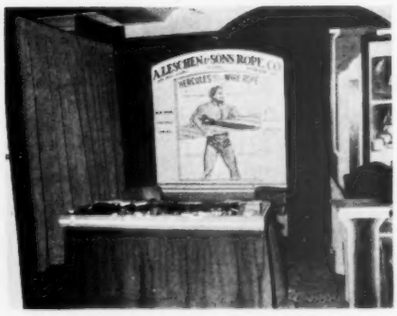
"If we turn to those restrictions that only apply to certain classes of society, we encounter a state of things which is glaringly obvious and has always been recognized. It is to be expected that the neglected classes will grudge the favored ones their privileges and that they will do everything in their power to rid themselves of their own surplus of privation. Where this is not possible a lasting measure of discontent will obtain within this culture, and this may lead to dangerous outbreaks. But if a culture has not got beyond the stage in which the satisfaction of one group of its members necessarily involves the suppression of another, perhaps the majority—and this is the case in all modern cultures—it is intelligible that these suppressed classes should develop an intense hostility to the culture; a culture, whose existence they make possible by their labor, but in whose resources they have too small a share. In such conditions one must not expect to find an internalization of the cultural prohibitions among the suppressed classes; indeed they are not even prepared to acknowledge these prohibitions; intent, as they are, on the destruction of the culture itself and perhaps even of the assumptions on which it rests. These classes are so manifestly hostile to culture that on that account the more latent hostility of the better provided social strata has been overlooked. It need not be said that a culture which leaves unsatisfied and drives to rebelliousness so large a number of its members has a prospect of continued existence, nor deserves it."

Were Freud alive to-day, we believe he would take a more hopeful view of the future of present-day culture if for no other reason than the great changes which have taken place in recent years in the public's attitude to the social side of man's development.

# SAND-AND-GRAVEL CONVENTION EXHIBITS







Reading down, left column: **Allis-Chalmers Mfg. Co., American Manganese Steel Division, Bucyrus-Erie Co., Deister Machine Co., Eagle Iron Works.** Center column: **International Harvester Co., Kennedy-Van Saun Mfg. & Engineering Co., A. Leschen & Sons Rope Co., Link-Belt Co., Marion Steam Shovel Co.** Right column: **Pettibone Mulliken Co., John A. Roebling's Sons Co., Screen Equipment Co., Inc., Simplicity Engineering Co., W. S. Tyler Co.** **(Other sand-and-gravel show booths are shown on page 34.)**

# Sand-and-Gravel Convention Draws Hundreds of Producers to St. Louis

WEATHER of uncommon severity greeted the hundreds of producers who came from all parts of the United States to attend the twenty-fourth annual convention of the National Sand and Gravel Association in St. Louis, January 17 to 19. In contrast to some years ago when, in the same city and the same month, conventionites sat on the benches of Forest Park while thermometers climbed above 70 degrees, temperatures far below zero and icy blasts that made windows rattle and weather strips whine kept people within doors, and an unusually large percentage of those registered were present at the meetings. This proved to be an advantage to many, because the program, developed further along the lines followed in recent years, gave prominence to the open-forum type of discussion and provided opportunity for participation by all those present.

The first session, which was held jointly with that of the National Ready Mixed Concrete Association, was opened by Retiring President J. Rutledge Hill with one of his characteristically simple, sincere and cordial addresses of welcome. His co-chairman, James F. McCracken, president of the ready-mixed-concrete group, followed him. Carl Brown, chief engineer of the Missouri State Highway Department, welcomed the visitors to St. Louis and the state, where previous conventions of the aggregates industries have been held.

How 29,000 human deaths, 1,000,000 injuries and $1,000,000,000 have been saved in four years by an intelligent approach to the highway-accident problem was told by Paul G. Hoffman, president of the Studebaker Corporation. Mr. Hoffman is also president of the Automotive Safety Foundation, an organization founded for the purpose of helping to reduce the appallingly large number of fatalities and injuries caused by accidents on the highways. This association was formed during the swell of the widely-aroused public interest that followed the publication of an article entitled "And Sudden Death," which appeared late in 1935. Everywhere the solution was sought in a further limitation of legal speeds. The Traffic Safety Committee of the Automobile Manufacturers' Association made a study of the accident problem in an effort to ascertain what measures and action of a genuinely useful character could be taken and what the cost would be.

This investigation revealed that there were 26,000,000 automobile vehicles—cars and trucks—in the United States, that some 40,000,000 drivers were involved in their operation over some 3,000,000 miles of what Mr. Hoffman called "good, bad and indifferent roads". These machines traveled 200,000,000,000 vehicle-miles in a year, or, on the assumption of an average load of two passengers per vehicle, a total of 400,000,000,000 passenger-miles. This amount of travel had been accompanied by 36,000 fatalities, 1,000,000 non-fatal injuries, and an out-of-pocket cash loss of more than $1,000,000,000. The accident fatality rate was 17.4 per 100,000,000 vehicle-miles.

It was concluded, first, that the limiting factors of the future growth of the automotive industry were accidents and congestion, and, secondly, that a well-organized and coördinated safety program could, if carried out effectively, reduce the accident rate at least a third in five years and that within twenty years the rate could be reduced


**NATIONAL SAND AND GRAVEL ASSOCIATION**
**1940**
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Boston, Mass.

OTTO S. CONRADES, Vice-President,
St. Louis, Mo.

HARRY DAVISON, Secretary-Treasurer,
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OTTO S. CONRADES,
St. Louis, Mo.

**Left to right: R. V. Warren, Western Pennsylvania Sand & Gravel Assn.; V. P. Ahearn, National Sand & Gravel Assn.; R. C. Fletcher, Flint Crushed Gravel Co., Des Moines; Alexander Foster, Jr., Warner Co., Philadelphia; Paul P. Bird, Boston Sand & Gravel Co., Boston, newly-elected president of the association.**

Left to right: C. W. DeLong, Traylor Eng. & Mfg. Co.; M. A. Neville, Western Indiana Gravel Co., Lafayette, Ind.; Stephen Stepanian, Arrow Sand & Gravel Co., Columbus, O.; O. E. Thaleg, Traylor Eng. & Mfg. Co.; C. Reigle, Western Indiana Gravel Co., Anderson, Ind.

a third more. The results of the program that was undertaken are illuminating. In 1936 the rate fell to 16.4, in 1937 to 15.9, in 1938 to 12.9, and in 1939 to 12.0. Twenty-nine thousand lives had been saved, 1,000,000 personal injuries had been avoided, and an estimated $1,000,000,000 had been saved through the reduction in the damage to persons and property.

Highway transport, big as it is when measured by to-day's figures, will grow to much greater dimensions. By 1960 highway traffic will have reached 500,000,000,000 vehicle-miles, if adequate roads and streets are provided to handle it safely. It will cost less than $25,000,000,000 to provide the 25,000 miles of super-highways needed outside the cities, in Mr. Hoffman's opinion, and at least another $25,000,000,000 to "make a good start" toward modernizing street facilities within the cities. The project might be completed within twenty years, he said. The acquisition of the necessary land for rights-of-way is a huge problem in itself, but existing taxes, he thinks, would make it possible, with the expected increase in traffic, to pay for such developments on a pay-as-you-go basis. The diversion of automobile tax funds to non-highway purposes must be stopped, if that is to be accomplished.

Of related interest was the discussion of the question, "What Is Ahead for Highways?", asked and answered by W. C. Markham, executive secretary of the American Association of State Highway Officials. He drew largely on some statistical data which have recently been compiled for presentation to a Congressional committee and gave an interesting and impressive picture of present and future highway needs. He called attention to the fact that there are 11,070 miles of highways more than two lanes in width outside our cities, an indication of the progress that has been and is being made toward the provision of traffic-safe roads in highly-traveled areas. Although 8,152 grade crossings have been eliminated there are still 28,127 that present hazards to highway traffic. There are 106,000 miles of rural highways that should be rebuilt, widened or relocated, and the cost of such improvements would be $3,560,000,000. There are 21,682 bridges that should be widened or rebuilt and the cost would be $445,000,000.

The incomes of the 48 state highway departments applicable to road construction totaled $1,096,000,000 in 1939 and their expenditures for construction and maintenance amounted to $1,135,000,000. Seventy-three per cent. of this income came from motor-vehicle license fees and fuel taxes, and 15 per cent. from the United States government; the remainder came from the sale of bonds and other sources. Of the more than $1,000,000,000 spent, 46 per cent. was expended for the purchase of rights-of-way and construction, 20 per cent. for maintenance, 13 per cent. for interest on bonded indebtedness, and 12 per cent. for local roads. The total bonded indebtedness of the states for highways amounts to $2,031,460,000. Although more than $1,000,000,000 more was spent by the United States government for roads in the last seven years than in the preceding seven years, excise taxes have provided more than that amount. Motor-vehicle owners have paid $7,267,000,000 in license fees and fuel taxes to the states and $1,965,000,000 in fuel and excise taxes to the federal government, a total of $9,232,000,000 in those seven years. Of that total, $5,500,000,000 has been spent from the state funds and $1,682,000,000 from the federal money, making a total of $7,282,000,000. In addition $638,834,000 has been spent on county roads and city streets. In the period 1930-1939 the purchases of rights-of-way alone cost $38,000,000 yearly on the average.

Culminating a period of six years of continuous gains, the construction industry in 1939 reached an annual total of $3,550,000,000 in construction contracts for the 37 states east of the Rocky Mountains, according to Thomas S. Holden, vice-president in charge of statistics and research, the F. W. Dodge Corporation. He spoke on "Construction in 1940." The 1939 figure was three times the amount for 1933, which was the lowest of the depression years.

Residential building, which has been gaining continuously for five years, reached $1,334,000,000, as compared with $249,000,000 in each of the years 1933 and 1934. There was no evidence of a speculative boom.

The year 1939 showed a gain of $353,000,000, or about 11 per cent., over the previous year in construction-contract totals in the area mentioned. Privately-financed building and engineering work increased $350,000,000, while publicly-financed work rose only

Left to right: J. R. Thoenen, U. S. Bureau of Mines; E. Eikel, Servtex Materials Co., New Braunfels, Tex.; R. J. Russell and C. W. Ankeny, Hardinge Co., Inc.

$3,000,000. Private non-residential building increased $49,000,000, private residential building $144,000,000, and privately-financed engineering construction $57,000,000. Publicly-financed non-residential building decreased $156,000,000, while publicly-financed residential building increased $104,000,000. These changes, combined with an increase of $55,000,000 in publicly-financed engineering work, resulted in the $3,000,000 gain mentioned.

Mr. Holden compared the increase in building activity of 11 per cent. with 1939 increases in other forms of activity: 22 per cent. in industrial production, 7 per cent. in factory employment, 17 per cent. in factory pay-rolls, 14 to 15 per cent. in freight-car loadings, and 3 to 15 per cent. in retail trade (varying with locality). These increases, like the building gains, were due to normal business improvement, and were not the result of war-boom causes.

The speaker tempered his estimates for 1940 by consideration of the fact that political controversies arising from the presidential election may have a mildly-disturbing effect on confidence among business men, so that the gains of the last quarter of 1939 may not be continued through the first quarter of 1940. He referred to the threat of rapidly-rising construction costs, although he believes that there is sufficient control and restraint within the construction industry itself to hold the increases "within a narrow range." The odds are in favor of moderate increases which will not check the rising volume of private construction. In spite of these considerations, in so far as they relate to the possibility of a temporary decline in activity, Mr. Holden is of the opinion that industrial production and employment, national income and retail trade will increase substantially for the year as a whole compared with 1939. Whatever adverse effects the war may have, it is likely to affect publicly-financed more than privately-financed work. The latter should increase from 10 to 12 per cent.

The federal-aid highway program of the United States Bureau of Public Roads and the public-housing program of the United States Housing Authority will be continued. Only about 36 per cent. of the latter had reached the construction stage by the end of 1939. In spite of the expectation that the Congress may authorize an extension of the original program and despite, too, the fact there will be a very large increase in public-housing contracts under the present program, these changes are more likely to help 1941 business than 1940. Mr. Holden, therefore, believes that there may be a 10-per cent. decline in the volume of publicly-financed construction in 1940.

The speaker's net estimates of 1940 changes are: Commercial building up 17 per cent. compared with 1939, manufacturing building up 37 per cent., all other non-residential building (principally public and institutional buildings) down 16 per cent., hospitals and religious buildings up a little, residential building up 15 per cent. (4 per cent. for privately-financed and 78 per cent. for publicly-financed), large-type residential building (apartment buildings and hotels, privately- and publicly-financed) up 36 per cent. one- and two-family dwellings up 6 per cent., heavy engineering construction (public works and utilities) down 15 per cent. with highway construction remaining about the same. The beginning of construction of the $117,000,000 T. V. A. dam in Kentucky, although affecting the 1939 record, will not materially alter the 1940 outlook, because most of the material purchases and of the employment will take place in 1940.

Inaugurating a new practice, the meetings of the state sand-and-gravel and ready-mixed-concrete associations, formerly held separately, were held in a joint lunch-time session. The innovation seemed to have the approval of all the interested persons present, for it provided an opportunity for an exchange of views and experiences concerning problems and situations that are not confined to single states or sections of the country but already exist or are likely to arise in other places. Representatives of sand-and-gravel and ready-mixed-concrete producer associations in Pennsylvania, Illinois, Ohio and Indiana told of specific problems related to freight-rate increases, sales taxes, and the harmonizing of the conflicting interests between producers of competing types of aggregates and of the manner in which they had been handled.

The Thursday morning meeting of the National Sand & Gravel Association was presided over by J. R. Thoenen, United States Bureau of Mines, Washington. The program was devoted to an open forum on operating problems and this session was one of the most interesting and best attended of the convention. Trends in specifications was the first subject and Stanton Walker, director of engineering, opened the discussion. He mentioned the trend toward smaller sizes of coarse aggregates and the growing practice of combining as many as three or four sizes in the concrete mix. The latter practice, while placing an added burden on the producer, helps to reduce segregation in loading and handling. According to Mr. Walker, more attention is also being paid to sand gradation and specifications are requiring more 50- and 100-mesh material. Soundness and deleterious particles are also getting more attention.

F. V. Reagel, Missouri State Highway Department, said that specifications are framed to get the highest quality of material economically available and the word "none" in a specification usually is interpreted to mean as little as possible. He believes that some things remain to be learned about freezing-and-thawing tests and that absorption is a good index to soundness. He also pointed out that only about 80 per cent. of the moisture removed from an aggregate in the laboratory can be returned to it.

Mr. Wood of the Texas State Highway Department said that his state specifies an open grading with specified top and bottom sizes. The mixes for every project are designed to fit the aggregates available. No direct relation-

Left to right: J. S. Hicks, Kennedy Van Saun Mfg. & Eng. Co., John Connors and J. H. Law, Western Indiana Gravel Co., Metropolis, Ill.; F. O. Riedy, Kennedy Van Saun Mfg. & Eng. Co.

Left to right: A. E. Ainlay and A. C. Small, Buda Co.; B. V. Hedrick, B. V. Hedrick Gravel & Sand Co., Lilesville, N. C.

ship had been found between the behavior of an aggregate and the concrete made from it in freezing-and-thawing tests. Additional discussion brought out the fact that vibration loses its effect on concrete too wet or too dry.

The sizing of sand and gravel was next discussed. Irving Warner, Warner Company, Philadelphia, described a method used in this territory to meet demands in the metropolitan area and in the states of New Jersey and Pennsylvania. He showed charts used in making the various gradings specified and explained their use in detail. Mr. Warner also stressed the fact that a properly loaded plant produces a more uniform product than one that is lightly loaded. He also asserted that the use of thin plate adds to screening efficiency. His paper is reprinted elsewhere in this issue of PIT AND QUARRY.

Mr. Walker said that the simplified practice specifications described by Mr. Warner were sponsored by the association through the United States Bureau of Standards. These specifications, he said, are the basis of A.S.T.M. and other specifications and are used in at least eight other states. Studies are being made in other plants and territories to broaden the application of these methods.

B. V. Hedrick, B. V. Hedrick Gravel & Sand Company, Lilesville, North Carolina, described a method used in his plant for blending various sizes of aggregates on a loading belt-conveyor and then testing the mixture before loading is actually started. In spite of this precaution, he said, segregation occurred in loading, and all the gravel is to be loaded from a vibrating screen suspended over the car. He advised producers to make tests of the material going into each car as a matter of self-protection and said that such a precaution would give engineers more confidence in their product.

Soft-particle elimination as usual had a place on the program. Ray V. Warren, Western Pennsylvania Sand & Gravel Association, Pittsburgh, said that in the rivers in that area the 6- to 8-inch pieces of gravel were usually the softest. Common practice now is to reject all gravel over 5 inches in size. Gravel containing these soft pieces, he said, can not pass the Los Angeles rattler test and concrete made from it scales badly. Mr. Warren said that producers will have to face new quality problems every year and should be prepared to do so. In Pennsylvania, according to him, concrete is on the defensive. He mentioned as a future possibility the splitting of sand near the 30-mesh line and the shipment of each fraction separately. Another future requirement may be the storage of sand for 24 hours before going into bins in order to control the moisture content. Cleaner products will be required and crushed gravel will have to be free of dust.

E. J. Nunan, Buffalo Slag Company, Buffalo, said that his company had been stock-piling sand for many years to control the moisture. He also described the methods used to get rid of shale.

F. J. Cloud, W. R. Bonsal Company, Lilesville, North Carolina, enlarged on the methods of blending described by Mr. Hedrick.

Mr. Walker said that a report now being prepared by the American Concrete Institute will prohibit blending at the plant and require that this be done at the job to insure against segregation.

The production of crushed gravel was next discussed. Mr. Thoenen briefly described studies now being made in the crushed-stone industry by the Bureau of Mines on the subject of particle shape and said that these studies will later be extended into the sand-and-gravel industry. The fundamental principle found so far, he said, is that the ratio of reduction controls to a large extent the percentage of cubical particles in the crusher product.

Mr. Walker stressed the growing importance of the shape of particles due to the growing use of gravel for ballast, bituminized aggregates, etc.

George W. Renwick, Chicago Gravel Company, Chicago, gave some of his company's experiences with the production of ballast. In 1911 specifications required ballast with 2-inch maximum size and containing from 60 to 65 per cent. crushed material. Now, he said, one inch is the maximum size and 85 per cent. of this must be crushed.

Mr. Walker pointed out that the reason most ballast specifications now require a higher percentage of crushed material is the lower maximum size now specified.

A representative of a railroad gave a history of railway ballasting and said that the increasing strictness of specifications is caused by the demand for faster and more comfortable trains. Present-day roadbeds, he said, are regarded as permanent structures and

H. V. Owens, Eastern Rock Products Co., Utica, N. Y., and M. B. Garber, Thew Shovel Co.

consist of from 12 to 50 inches of aggregates over the dirt. The finer control of track elevation now necessary is the reason for the smaller sizes of aggregates now used.

Clarence Stumpf, McGrath Sand & Gravel Company, Lincoln, Illinois, cited his company's experiences with the progressively finer ballast specified by railroads. Specifications now require material from 1½ down to ½ inch with from 25 to 30 per cent. crushed and very little sand.

Mr. Walker said that one reason for the trend toward finer ballast with more fines than formerly is that such material has less of a tendency to foul and that greater stability is obtained for the amount of crushed aggregate present.

J. H. Evans, Sturm & Dillard Company, Columbus, Ohio, said that the Chesapeake & Ohio Railway originally specified a top size of 1½ inch and considerable sand. Now the sand has been eliminated and the tendency is toward smaller top size with about 20 per cent. crushed. The elimination of sand, he said, is to improve drainage.

Mr. Walker said that most railroads eliminate sand entirely from ballast but that there is a tendency toward the use of a coarse sand with nothing under 16-mesh, which gives a filtering action.

Mr. Thoenen opened the discussion of loading and hauling problems in the pit by describing some of the time studies now being made in quarries. He said that the studies already made show that truck haulage has a considerable differential over locomotive haulage in loading efficiency.

Stabilized mixtures also came in for some attention. Mr. Walker reviewed the growing use of stabilizing materials in secondary-road construction.

Mr. Reagel reviewed the progress made in stabilization since he spoke on that subject at the 1939 convention. He said that the use of plant mixes is advisable in or near the larger cities but that road mixes are more practical in rural areas.

C. W. Purdy, Killbuck Sand & Gravel Company, Killbuck, Ohio, said that coarse sand out of which masons' sand had been taken was formerly wasted but is now used for this purpose.

Mr. Reagel commented on the growing use of stabilized aggregates for shoulders and for widening existing higher-type pavements. It was also suggested that the size of this potential market justified more study by producers than it has received.

The annual meeting and luncheon of the Manufacturers Division of the National Sand & Gravel Association was held Thursday noon.

The Thursday afternoon combined meeting of the sand-and-gravel and ready-mixed-concrete associations was presided over by John Prince, Stewart Sand & Material Company, Kansas City. V. P. Ahearn opened the meeting with his annual report, *Business Conditions in the Sand-and-Gravel and Ready-Mixed-Concrete Industries* which is quoted in part.

"A questionnaire, carefully worked out and directed toward those questions which we believe always form the basis of individual discussions between producers when they meet, was sent out about December 1. . . . We asked each of our correspondents to consult with others in his area before reporting to our office, and since so many of the questions did not lend themselves to answers in precise mathematical terms, we made it plain in each case that approximations would be sufficient for our purpose.

"The first question was: 'How did the volume of business in your area in 1939 compare with 1938?' It appears that the volume of sand and gravel business in 1939 represented an increase of approximately 15 per cent. over 1938; there was probably an increase of about 20 per cent. in ready-mixed-concrete volume. There are exceptions to this national figure. There were declines in southern California, in the New York City area, in Iowa, Michigan and in Florida, and volume in 1939 held its own with 1938 in northern California, northeastern Pennsylvania, northern Missouri, and Texas. The largest increases in volume were experienced in Tennessee, New England, eastern Pennsylvania, western Pennsylvania, District of Columbia, Oklahoma, Illinois, northern Indiana, Colorado and Minnesota; increases of smaller proportions were registered in Ohio, central and eastern Indiana, Utah, Kentucky, southern Missouri and in New York State. In some of these areas general construction had been badly deferred, notably in New England, eastern Pennsylvania and Oklahoma.

"The second question was: 'What is the prospective volume of business in your area in 1940?' Here it is extremely difficult, because of the uncertainties with reference to Federal public-works expenditures, to make any intelligent assumptions. I would say, however, that on the whole we should probably prepare for a decline in sand-and-gravel business in 1940, but that the ready-mixed-concrete industry may be able to hold its own. Of course there are localities which do not harmonize with the national expectation of a decline. Oklahoma can look forward to an even better year in 1940 than it had in 1939; Colorado should continue to register an improvement; eastern Pennsylvania, where depression has been the rule for so many years, should show an increase of about 15 per cent. this year as compared with 1939; there should be increases in southern California and in northeastern Pennsylvania; and Michigan, particularly in the Detroit area, should have a fine construction season with active sand-and-gravel and ready-mixed-concrete demand; there should be increases in Illinois and northern Indiana and probably a slight increase in other sections of Indiana; and Ohio should show an increase of about 10 per cent. Other sections expect to maintain their 1939 volumes if there are no untoward developments. This is the case in the District of Columbia, Kentucky, New England, southern Missouri, New York State, northern California, the southeastern states, northern Missouri and Texas; still other areas are prepared for a decline in business this year, which seems to be the case in Utah, in western Pennsylvania, Minnesota, Tennessee, New York City and Iowa.

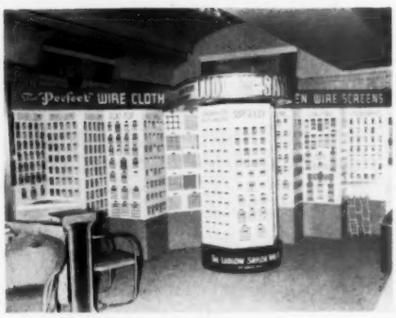
"The third question was: 'How did the price level in 1939 compare with the price level in 1938? What is the outlook as to prices in 1940?' It must be concluded that prices in 1939 were even lower than they were in 1938, as a national situation. Here and there are exceptions to that condition, but, on the whole, a district has done well if the 1938 price level was maintained in 1939, even though last year there were additional increases in costs of operations due to Federal and state statutes imposing new obligations upon employers. While the 1939 price level in Texas compared favorably enough with 1938, the 1940 outlook is somewhat discouraging because of local-pit and contractor-producer competition. Further declines seem to be threatened in northern Missouri and New York State, in New England, Iowa, western Pennsylvania, and Michigan, and while prices were off in southern California, there they may have touched the absolute rock bottom and tend toward increasing in 1940. Prices seem to have held their own for 1939 and to hold the same prospect in 1940 in the southeastern states, in northern California, southern Missouri, Ohio, Tennessee, Minnesota and in Utah. In other areas a more stable price situation seems to have been reached.

"The fourth question was: 'In general, what relation did volume of de-

J. M. Thistlewaite, Nordberg Mfg. Co.; C. W. Purdy, Killbuck Sand & Gravel Co., Killbuck, O.; Walter J. Flach, Ohio Gravel Co., Cincinnati.

Left to right: H. Herbert Hughes and J. R. Thoenen, U. S. Bureau of Mines; Sheldon Stearns, Traylor Eng. & Mfg. Co.

# SAND-AND-GRAVEL CONVENTION EXHIBITS



Reading down, left column: Broderick & Bascom Rope Co., Buda Co., Cross Engineering Co., General Electric Co., Hardinge Co., Inc. Center column: Hendrick Mfg. Co., Lima Locomotive Works, Inc., Ludlow-Saylor Wire Co., McLanahan & Stone Corp., National Supply Co. Right column: Nordberg Mfg. Co., Taylor-Wharton Iron & Steel Co., Thew Shovel Co., Traylor Engineering & Mfg. Co., Westinghouse Electric & Mfg. Co. (Other sand-and-gravel show booths are shown on page 28.)

Left to right: Abe Goldberg, M. E. Bechtold and Carl L. Morris, Allis-Chalmers Mfg. Co.

mand bear to capacity in your area during 1939?' If a national figure were given on this question, I would say that the returns indicated that in 1939 demand for sand and gravel and ready-mixed concrete represented not more than 50 per cent. of capacity, although that figure for the sand-and-gravel industry alone would be much higher. Estimates of the relation of volume of demand to capacity ran as low as 25 per cent, in such sections as Utah, southern Missouri, northern Missouri, Texas, Kentucky, and Oklahoma. Slightly higher averages were registered in the southeastern states, in northern and southern California, in Ohio, Tennessee, Minnesota, Michigan, western Pennsylvania, Indiana, New York, eastern Pennsylvania, New York City, northeastern Pennsylvania and Illinois. Strong market demands last year in other sections pushed the figure up in some cases as high as 75 per cent. and probably it may be said that in the case of the ready-mixed-concrete industry in a few sections, there were certain stretches in the year when full capacity was utilized; but of course that industry has a much more difficult problem than the sand-and-gravel industry has in adjusting itself to daily demand.

"The fifth question was: 'What type of projects produced the greatest demand in your area in 1939?' I made the observation, in submitting this report last year, that while highways and streets continued to form the backbone of our largest demand, there had been surprisingly good increases in the demand for large industrial structures and for housing construction. That trend was even more pronounced in 1939, but there are indications that it may be reversed in 1940. For 1939, however, some sections reported very little dependence on highways and streets last year. New York State depended upon government building projects, upon public schools and Federal housing projects; Michigan reported that a large portion of its 1939 demand came from private building; Minnesota placed its main emphasis on private housing projects financed by government loans, on public schools, and on public buildings made possible by government funds; southeastern Tennessee found a large demand in 1939 from public housing projects; southern California depended mainly upon residential, industrial and commercial building; northern California found its principal market in stores, warehouses, in homes and industrial structures; northern Missouri showed an increase in residential building, but a decrease in commercial and public building and probably a new low in highway construction; buildings for the government accounted for the principal market in the District of Columbia; and in New England the greatest demand came from large public structures, housing and large industrial structures. Highway and street pavement continued to be the most important outlet for our products in northeastern Pennsylvania; in Indiana where, however, ballast demand was active for the first time in many years; in central Tennessee, in Ohio, in the southeastern states, in southern Missouri, in Texas, in Kentucky, in Oklahoma; but housing demand was strong in many sections, including Colorado, New York City, and in eastern Pennsylvania. On the whole I should say that we had a better diversification of demand in 1939 than had been the case for many years, with housing construction coming rapidly to the front and with large industrial structures and large public structures probably of equal importance. Railroad ballast was weak in almost every section of the United States, with the exception of Illinois, Indiana and Texas.

"The sixth question was: 'What was the division between public works of all kinds and privately financed projects in your area in 1939?' Again I must report the striking unanimity in the replies which I received to this question from all sections of the United States. If I dealt in national figures, I should say that about 85 per cent. of the sand-and-gravel and ready-mixed-concrete market in 1939 was made possible by public expenditures. Thus 1939 continued and enlarged the division which I reported for 1938. The difference by sections, so far as this question is concerned, is solely one of degree. In western Pennsylvania public works accounted for 90 per cent. of our market; public works was practically our whole market in Oklahoma; in northeastern Pennsylvania, public works accounted for 90 per cent. of our market; practically the same situation applied in Tennessee, in New York City, in Colorado, in Kentucky, in Texas, in Illinois, in Indiana and in Ohio. The division came closer to 3 to 1 ratio in New York State, in Michigan, in Minnesota, in southeastern Tennessee, in the southeastern states, in the District of Columbia and in eastern Pennsylvania and the gap came even closer together in northern California, in southern Missouri, in Utah, and private construction was responsible for about half of our market in southern California, where recent months have witnessed a wide industrial expansion.

"The seventh question was: 'What type of projects will probably produce greatest demand in your area in 1940? What will be probable division between public works of all kinds and privately-financed projects?' It seems clear that highways and streets will strengthen their position this year as offering the largest markets for our two industries. The probabilities are that public expenditures will be responsible for about 75 per cent. of our total market, with a larger responsibility for private financing, thus producing a better situation than that which existed in 1939. Highways will dominate the picture in Oklahoma, in northern Pennsylvania, in Kentucky, in Texas, in Tennessee, Ohio, Minnesota, eastern Pennsylvania, in northern California and in western Pennsylvania. Large public structures, housing, and large industrial structures will feature the 1940 market in New England; public buildings will continue to be the most important outlet in the District of Columbia; and the better outlook for

privately financed building gives reason to hope that industrial construction will improve in a great many states. Others looking forward to a better private demand are producers in southern Missouri, in Utah, in New York State, in Michigan, and in the southeastern states.

"The eighth question was: 'To what extent did the public-works program in your area in 1939 depend upon emergency Federal appropriations such as W.P.A. and P.W.A.? What is prospect for expenditure of Federal emergency appropriations in your area in 1940?' It is at once evident that Federal appropriations were responsible to a controlling degree for the public-works program in 1939, and the same situation will probably prevail in 1940. Here again the difference by sections is principally one of degree. In certain areas Federal expenditures were responsible for an overwhelming share of the total market—in New England, in northern Missouri, in western Pennsylvania, in Colorado, in Ohio, in the District of Columbia, in Minnesota, in northern California, in Illinois, in Indiana, in southern California, in New York State, in the southeastern states and in New York City. Federal expenditures were less important in Oklahoma, in northeastern Pennsylvania, in Kentucky, in Texas, in Tennessee, eastern Pennsylvania and in Michigan. It is clear that the W.P.A. program has been helpful in large metropolitan centers, but this is even more the case in respect to the P.W.A., the discontinuance of which will be a major blow to our two industries.

"The ninth question was: 'To what extent did the public-works program in your area in 1939 depend upon projects financed exclusively by divisions of government (states, counties, and cities)? What is prospect for expenditure of public-works funds by divisions of government in your area in 1940?' Divisions of government played only a minor *rôle* in creating a sand-and-gravel and ready-mixed-concrete market in 1939, and, on a national scale, that situation will not change in 1940. For the country as a whole I believe that divisions of government accounted for only about 15 per cent. of the public-works program last year, but they will do better this year in some areas, including Indiana, eastern Pennsylvania, Tennessee, New York State and southern California. Notwithstanding that brighter part of the picture, it is still true that divisions of government think in terms of Federal loans and grants when they work out their public-works programs these days.

"The tenth question was: 'Did privately-financed construction in your area increase or decrease in 1939 compared with 1938? What is the prospect for privately-financed construction in your area in 1940?' While it is difficult to place one's finger upon the majority sentiment growing out of the answers to this question, I believe it is a fair conclusion to report that privately-financed construction increased substantially in many areas in 1939 as compared with 1938, and that in these same areas the prospect is that privately-financed construction will assume an even more important position in 1940. On the whole, the reason for the increase in privately-financed construction is believed to be the larger confidence entertained in business circles. Northern Missouri reported that private construction showed a decided trend toward improvement in 1939; housing demand was rather good in western Pennsylvania; industrial buildings and apartments were active in Colorado; private construction showed an increase in the District of Columbia mainly because of the phenomenal growth of Washington in recent years; privately-financed construction was much better in Minnesota, in Illinois, in some portions of Indiana, in Utah, New York City, southern Missouri, Michigan, Texas where the prospects for 1940 holds the promise of added improvement, and in southern California where the prospects for improvement in privately-financed construction are alleged by my correspondent to be based on the wider public appreciation of the climate enjoyed in that section. Privately-financed construction, on the other side of the picture, declined in 1939 in New England, in the southeastern States, and it remained about the same in the other sections from which I heard.

"The eleventh question was: 'To what extent did the private aggregate industry in your area have to contend with plants owned and operated by divsion of government, either with or without W.P.A. funds? If such competition encountered in past, did new W.P.A. law effect any relief from problem in 1939?' This is a very serious problem or no problem at all according to the area from which a report is received. Government competition with the private aggregate industry is practically unknown in western Pennsylvania, District of Columbia, Michigan, Texas, Kentucky, eastern Pennsylvania, southwestern Illinois, Ohio, southern California, Florida, northeastern Pennsylvania, New York State, the New England states and northern California; but it starts to become a problem in Indiana, and assumes the proportions of a tremendous problem in northern Missouri, in Colorado, in Minnesota, Utah, Tennessee and Oklahoma. There were many crushed-stone plants built and operated by W.P.A. funds which have created a serious problem for the sand-and-gravel industry, and, with the exception of Minnesota, all reports are that the new W.P.A. law did not effect any relief on this question of subsidized competition. Minnesota reported that governmental competition was slightly less than in 1938, due to two things: fewer W.P.A. projects and the prohibition against solicitation by public officials of sales for materials produced in W.P.A. plans.

"The twelfth question was: 'What would be effect on building volume in your area if there should be substantial curtailment of Federal expenditures? Will state or states in your area match Federal funds under Federal-aid Highway Act? Has there been serious diversion of highway funds?' From the standpoint of our two industries in a national sense the answer to this question must be that a substantial curtailment of Federal public-works expenditures would have a drastic effect on our volume in 1940. That is clear from

**Left to right: Emil Deister, Jr., Deister Machine Co.; Otto S. Conrades, St. Louis Material & Supply Co., St. Louis, newly-elected vice-president of the association; G. E. Singletary, Chicago Gravel Co., Joliet, Ill.; B. J. Roberts, J. S. Davidson and Irwin F. Deister, Deister Machine Co.**

answers to the questions to which I have referred previously. A different report, however, is made for Michigan, Texas, and for northeastern Pennsylvania, where there is less dependence upon strictly Federal expenditures, but even in those areas the Federal-aid highway program occupies a *rôle* of first importance. Large diversions are reported, particularly in New York where there is an annual diversion of about $65,000,000 of highway funds. The diversion in Illinois last year approximated that of 1938, which totalled about $6,700,000. Some states may find themselves unable to match Federal-aid funds, including Georgia, Missouri and Kansas.

"For a summary of this summary, I would say just about this: We had a 15-per cent. increase in business in 1939 as compared with 1938; but we shall have trouble holding to this volume in 1940 and some decrease may be expected. The price level on the whole was down; demand represented about 40 per cent. of the capacity; highways and streets are our principal markets, but housing and public buildings begin to take on more important proportions. Highways and streets will probably be even more dominant in creating our market in 1940, and Federal public-works expenditures will be our principal source of dependence. Divisions of government, on the whole, are not responsible for the public-works program, but there is more than one sign that, given the slightest encouragement, privately-financed construction will come back into its own in our field and be greeted warmly with wide open arms. Governmental competition with our industry is a spotty condition, but where it exists, it is ruthless and brutal. If the W.P.A. program is curtailed, that problem will decline in importance. . . .

"All the things which I have mentioned in this report point to the great job which management has in our two industries, to the need for close supervision, to the necessity for constant striving after economical production and distribution, and to the obligation which every executive owes to his company to keep it alert to the rapidly-shifting scene to which we must adapt ourselves if we are to be prepared for the much bigger market which, sooner or later, this country is sure to experience. I am one of those who believe that we have just begun to build the United States."

*Human Relations Aspects of a Practical Safety Program* was the subject of a paper presented by L. P. Warner, Jr., industrial relations manager of the Warner Company, Philadelphia, which has about 900 employees. "Though industry's primary objective is profit," said Mr. Warner, "present-day trends point to an ever-increasing interest in the welfare of its workers, or associates as they are known to-day. This interest finds expression in such efforts toward employee betterment as group life, accident and sickness, hospitalization insurance, pensions, vacations with pay, athletics and, of course, health and safety." A placard with pictures and some of the departments' procedures was used to illustrate the talk.

Mr. Warner stressed the importance of coördination as well as coöperation in promoting safety and good labor relations. Several practical examples were used by the speaker to illustrate this point. He also described the following industrial-relations functions that help to guide these relationships.

"(a) *The Physical Examination* given all new employees with check-ups at least every two years. Here we endeavor to select a man of suitable health for the job with certain definite restrictions for truck drivers, crane operators, etc., and any job where the lives of other human beings depend upon physical fitness. Though we employ a number of one-eyed men, I do know of at least one concern that employs a blind man who, incidentally, has made safety suggestions by virtue of the fact that he could hear that something was wrong.

"(b) *Employment Card.*—We are at present installing a new History and Qualification Card which records everything about an employee. This was especially designed in an effort to bring men and management closer together and to record work progress. Some of the items on this card are—and please notice their direct tie-in with a safety program—complete history with company, experience other than with company, personal history and family background, insurance and savings, physical

**Port side gypsy showing push-button control switch and method of allowing the rope to coil itself below deck.**

**Steel steps of proper width and depth which are replacing old wooden steps. Platforms made of old screens are excellent in dusty places.**

record details, accidents, suggestions, education, hobbies and social data, together, of course, with reasons for resignation or discharge, if any. A check on old age provisions is also kept.

"(c) *Workmen's Compensation.*—Accident Reporting and Filing.

"1. We are self-insured for our workmen's compensation risks and I imagine that this is as good a place as any to describe our set-up for handling accidents and their costs. For my own part, I much prefer forgetting about the latter because I find that when everybody works together to reduce accidents, costs are proportionately reduced. However, some of you may be interested to know that our total workmen's compensation and medical costs, physical examinations, chest X-rays and departmental salaries amounted to 1 per cent. of the total company pay-roll during 1938 and to .9 per cent. during 1939. This last figure is the one to look at, for generally when production increases, new hands or old employees returning to work may find themselves a bit rusty, so to speak, and accidents increase. This trend we were able to curb, which is a practical test for any safety program.

"2. As self-insurance, we have naturally set up a complete network of accident forms which are designed not only to protect the company in cases of undeserved claims but also the employee, because it is our earnest desire to rehabilitate an injured employee as quickly as possible in order to avoid unnecessary loss of earning power and earning time. Accidents, you know, are costly to everyone.

"(d) *House Organs.*—Supplementing our plant safety work, we publish several employee publications. One, the *Foreman's Bulletin*, goes to all men directly responsible for departmental safety and first aid. On alternate months, the *Safety News and Views*, another mimeographed publication, goes to all employees. It is designed

The basket-type clothes lockers which permit damp clothing to dry overnight.

to foster safety in the home, on the highway and in the playground. In addition, we have a printed magazine, *Warner-American News,* in which group records and individual achievements are incorporated.

"(e) *Posters, Outside Service, etc.*—Of course no safety program is complete without a liberal supply of posters. We make some of the posters ourselves, to give them local appeal. We also make extensive use of the National Safety Council materials and follow the standards of safety and health set up by a special committee of the old N. R. A. This committee did an excellent job of drafting a safety code for the crushed-stone, sand-and-gravel and slag industries.

"(f) *Safety Meetings.*—This is one of the most interesting of the human aspects of our safety work. At one of our plants we have just completed a year's experience of having 'safety observers' from the various departments sit in on the meeting. These fellows from the rank and file contribute heavily to the success of our safety program. They serve a term of only one month and wear badges to indicate authority to warn fellow-employees of unsafe working methods, apparatus, etc. If any of you have not tried this, please do so. It will move slowly for a while, but when the group of men get the idea and learn to feel that safety is their responsibility—well, you are going to learn some things you never dreamed of."

Mr. Warner read a few items from the minutes as kept giving suggestions to improve safety. He then went on with his description of the functions of his department.

"(g) *Foremen's Meetings.*—We hold special educational meetings for Foremen covering 'Handling of Men,' 'Working Together,' 'Waste,' etc.

"(h) *Contests and Awards.*—Fleet Safety.—You would be surprised at the interest shown by the men in contests. This country really thrives on the competitive spirit. Aside from the national trophy, for which our Van Sciver plant competes, we have inter-departmental trophies, dinners, picnics, and special Christmas parties, etc.

"Under this topic, I am going to say a few words about fleet safety. We operate about 110 trucks, of which 80 are for concrete. The story of fleet safety with us boils down to a couple of main issues. The most important is the bonus system. . . . We find that this is more effective than anything else in obtaining good fleet results. Some years ago, we had a bonus plan which was dropped when the depression came along. During the time the bonus plan was not operating, coöperation among the men was not nearly so good as when the plan was in operation.

"The trucks, of course, must be kept in A-1 condition, so we operate our own repair and paint shop for this purpose. Another thought we consider of the utmost importance and one which is constantly hammered home is—*'They never have the right of way.'*

"As far as costs are concerned, an insurance company recognized the company's interest in safety; that is why we are able to maintain a low rate of coverage."

Mr. Warner then showed slides to illustrate these points. A number of these are reproduced herewith. In conclusion he said:

"We have made and are continuing to make definite progress in our accident-prevention campaign. There still remains much to be done, much to be learned, but these points we know are essential:

"1. In a decentralized industry there should be centralized control of all safety work combined, where possible, with the department designated to handle personnel or industrial relations.

"2. The men must be *interested* in and the management *serious* about preventing accidents.

"3. An active safety program requires that men on the job participate in it.

4. It is essential to keep complete records of accidents, costs and general medical routine, such as physical examinations. Do everything you can to help each employee maintain and improve his health. Physical examinations are not for the purpose of weeding out employees."

Next on the program was the annual presentation of safety trophies. A plant of the McCrady-Rodgers Company, Pittsburgh, won the first prize in the large-plant division. The first prize for smaller plants was won by Graham Brothers, Inc., Los Angeles.

*Activities of the Federal Government Affecting the Sand-and-Gravel and Ready-Mixed-Concrete Industries* was the subject of the next paper by V. P. Ahearn, executive secretary of the association. He said in part:

"From the amount of minimum wages which they pay to the volume of business which they experience every year, our two industries are intimately affected by the daily activities of the legislative and executive departments of the federal government. Unless present trends are arrested by the reassertion of state controls starting back home, the prospect is that the Federal government will have an increasing authority over our business and other business.

"It is a mistake to think of present governmental policies as emanating exclusively from Washington. They are fixed by the Congress which comes from all the states. If the present governmental policies are wrong, they must be corrected by local action.

"Many states have surrendered their right to sovereignty by turning to Washington for federal subsidies. Pressure groups of all kinds are seeking federal and not state action, except where, as in the case of interstate trade barriers, certain local industries can protect themselves against what they call foreign competition.

"These are things which explain the present situation of central authority. If states demand and receive federal cash bounties, they must expect to surrender political sovereignty and local controls."

Mr. Ahearn went on to describe the variegated make-up of the New Deal and the difficulty of making a detailed study of all the statutes and administrative agencies affecting these two industries.

Speaking of the federal wages-and-hours law, Mr. Ahearn said that this has now gone far beyond the original purpose of sweatshop elimination, and that employers "face the prospect that the Congress may upset the whole national economy each session by raising wages and lowering hours of employees, or by lowering wages and raising hours of employment. It is thus difficult for business to plan ahead.

"The unions have the acute problem of what to do about present trends in governmental policies. That trend, carried to its logical conclusion, will result in eventual displacement of unions by government."

He then compared the differences in the aims of the A. F. of L. and the C.I.O. and predicted that the latter organization will soon join the former in efforts to keep government out of the field of improving labor conditions. In his opinion the act necessarily reflects the conviction that organized unions have failed to accomplish the necessary results for the improvement of working conditions.

Mr. Ahearn then reported that "as a result of the application filed by the National Sand & Gravel Association, the Wage and Hour Division of the Department of Labor, in a decision dated January 16, gave a modified recognition of our industry as a seasonal enterprise within the meaning of the law." This action is fully reported in another article in this issue of PIT AND QUARRY.

Mr. Ahearn next discussed the subject of rate conversion. "In my own opinion, so long as an employer promulgates the new rate—by that I mean, duly advises his employees of this new rate—I am confident he has the right to establish base rates of pay for employees at any figure that he is able to pay, whether such employees were on his pay-roll prior to October 24 or may be employed in the future, provided the base pay is fixed at not less than the minimum provided in the act. . . ."

"Another question of importance to us is hours of employment with respect to our truck drivers. This is particularly so in the ready-mixed-concrete industry. I believe that the hours of employment of truck drivers engaged in interstate commerce are covered not by this law but by the Motor Carrier Act of 1935. At one time the Wage and Hour Division took the position that that was not so, until the Interstate Commerce Commission utilized the authority provided for in that law to fix hours of employment for private truck drivers engaged in interstate commerce. But recently the commission had presented to it a recommendation from one of its examiners that the hours of employment for commercial truck drivers, 60 hours a week, be applied to private truck drivers. I think that we should support that position, because the Motor Carrier Act of 1935 is not grounded upon any principle of compulsory distribution of jobs but upon public health and safety.

"The wages-and-hours law is geared to the nature of the work of the employee and not to the scope of the market of the employer. Therefore, an employee is covered by the statute only when he is engaged in interstate commerce or in the production of goods which later move in interstate commerce. However, the Wage and Hour Division has ruled that there cannot be any separation in a given work-week. In other words, if an employee in [any part of] one work-week produces goods which move in interstate commerce, his time for that whole work-week is covered. Otherwise the separation can be made. . . .

"Several rulings issued during the year by the Department of Labor in connection with the Walsh-Healey Act of particular interest to sand-and-gravel and ready-mixed-concrete industries are as follows:

"Where producer signs a contract for delivery of materials to government, in which truck transportation is involved and in which the trucking is done by a *bona fide* trucking contractor, the employees of that *bona fide* trucking contractor are not subject to the act; but drivers of trucks owned by the producing company and owner-operators are subject to the act.

"Marine workers on barges, such as barge captains or workers on dredges out of touch with the shore for periods in excess of 24 hours are not regarded as subject to the act.

"In connection with the question of irregular deliveries I would like to recite the text of the department's ruling. 'In case of irregular deliveries of ready-mixed concrete or sand and gravel the work-week of the producer will be considered to begin on the day upon which work is commenced on the contract in the week of the irregular delivery; that is, the work-week under the act will commence, in the case of irregular deliveries, on the day upon which delivery is made in a given week unless the contracting party indicates a preference to have his regular work-week followed. The term "irregular" is used to indicate those deliveries that are relatively infrequent and unpredictable.'

"The ruling on stock-piles says: 'Where a contractor, who has taken a contract subject to the provisions of the act for the supply of sand and gravel, has in stock, at the time the performance of the contract is to begin and at all times during the period that the contract is in effect, stock adequate to supply the demands of the government under the contract, it may be considered that these materials are in stock within the meaning of the regulations, even though the stock-pile is added to at regular intervals to meet the demands of the commercial end of the contractor's business.' . . .

"Indefinite contracts have been a real problem under the act. Does the Walsh-Healey Act apply in respect to certain contracts executed by producers with the W.P.A. in which the W.P.A. estimates, but does not guarantee, its need for materials during a certain period? If it does not exceed $10,000, the act does not apply. The producer has to take the chance. . . . If he decides not to comply with the act on the assumption that the materials ultimately shipped under the contract will not exceed $10,000 and guesses wrong, he has to apply the act retroactively, whenever the value of the shipment of materials goes beyond $10,000. . . .

"As to the ready-mixed-concrete industry, an important decision rendered by the Public Contracts Division in the case of the Old Colony Crushed Stone Company at Boston held that the eligibility-to-bid provisions of the Walsh-Healey Act meant that a company without a production history in sand and gravel or without a production history in ready-mixed concrete was not eligible to bid under this law. That is a provision designed to discourage bid peddling and bid shopping. . . .

"The Department of Justice invoked anti-trust laws in a jurisdictional dispute between the teamsters and engineers as to who had the right to exert jurisdiction over the drivers of ready-mixed-concrete trucks in Washington. This action came as a bombshell to the A. F. of L. which felt that it had a natural right to fight these jurisdictional disputes out to the bitter end, regardless of whether innocent bystanders suffered. The A. F. of L. complained to the White House and to the Congress about what it alleged to be the anti-union bias of the Department of Justice, but Assistant Attorney-General Arnold insisted the 'unions stand to gain' by the efforts of the government to prevent 'the use of legal rights of association in an illegal way.' Mr. Arnold listed five types of labor-union activities which he believes are violations of the anti-trust laws:

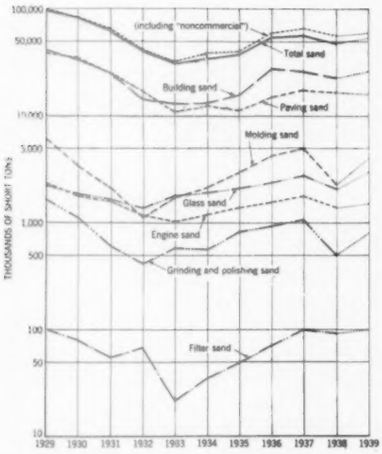
"(1) Unreasonable restraints designed to compel the hiring of useless and unnecessary labor. That is an extremely important statement with reference to the ready-mixed-concrete industry which three years ago had to handle a very difficult problem created by a demand of the engineers' union that a member of its union be placed on each of our trucks in addition to the driver.

"(2) Unreasonable restraints designed to enforce systems of graft and extortion by a racketeer masquerading as a labor leader.

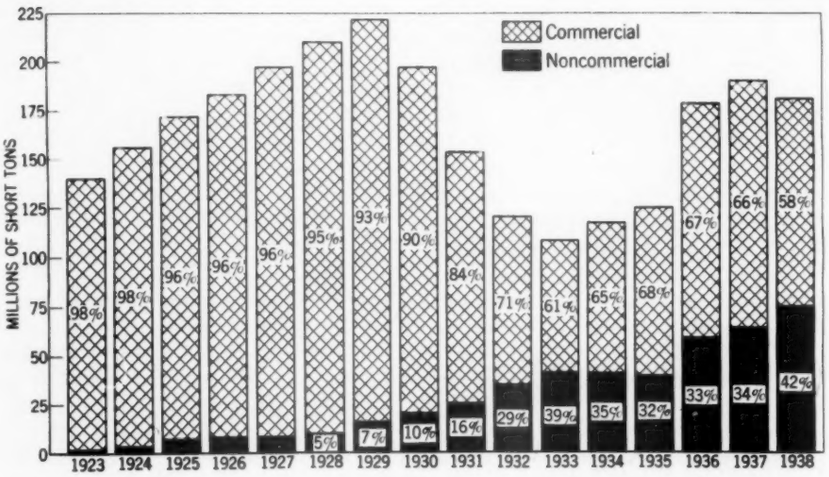
"(3) Unreasonable restraints designed to prevent the use of cheaper materials, improved equipment or more efficient methods.

"(4) Unreasonable restraints designed to enforce illegally-fixed prices.

"(5) Unreasonable restraints designed to destroy an established and legitimate system of collective bargaining. This one means that if employees are organized by a C.I.O. union and the American Federation of Labor trade unions boycott that company because of that fact, notwithstanding the fact




**Production of various kinds of sand by years, 1929-39.**




**Production of sand and gravel by commercial and non-commercial operations, 1923-38.**

that the employer has no choice but to deal with the C.I.O. under those circumstances, the Department of Justice will use the anti-trust laws and endeavor to secure an indictment against the boycotting union. Terrific political pressure has been exerted on the Department of Justice because of this union program, and it may be significant that the department suffered a $100,000 cut in its appropriation this year. But there can be little doubt that the department's activities in the field of anti-trust laws have elicited a widespread public approval, particularly as the department has indicated a willingness to challenge illegal activities of trade unions wherever they are found."

The annual dinner jointly sponsored by both associations was held Thursday night. It was an informal affair and the program consisted of entertainment and dancing.

At the Friday morning session, presided over by Robert J. Potts, former president of the association, Executive Secretary V. P. Ahearn reviewed the work of the organization in the year just closing. He discussed the activities of his department of the association in matters affecting the business interests of its members.

H. Herbert Hughes, chief economist of the Mineral Production and Economics Division of the United States Bureau of Mines, presented an illustrated review of sand-and-gravel production. He showed the extent to which 1939 represented an improvement over 1938 from the viewpoint of the producer and he offered indicative information pointing to a good outlook for 1940 despite the curtailment of funds available for public works.

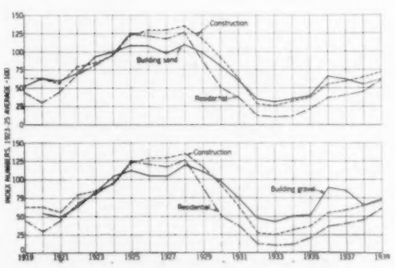
The speaker showed by lantern slides how closely the production of sand and gravel, reduced to percentages of the 1923-1925 average, parallels the output of the consuming industries. Thus, the output of molding sand is closely correlated with that of pig iron and malleable-iron castings. Glass-sand output, however, does not exhibit the same correspondence with that of plate glass and glass containers, because plate-glass production is reported in square feet and the thickness of the product has not been uniform throughout the period of comparison. The production of grinding and polishing sands bears a general relationship to the output of castings, dimension stone, and plate glass. Engine-sand output is directly related to railroad traffic, of which freight-car loadings are a good indicator. Building sand and gravel have followed the construction-contract awards closely. The high level of building-gravel production during the last decade must mean that gravel is being more widely used as a coarse aggregate in all types of construction. In a general way the production of paving sand and gravel follows concrete-pavement contracts, but the increasing use of gravel has an effect on the demand for paving gravel. Sand and gravel are finding increasing use in bituminous paving.

The net result of a study of all these indicators seems to justify the conclusion that sand-and-gravel production must have been about 10 per cent. greater in 1939 than in 1938. How much of 1939 production was attributable to commercial plants can not be said, but recent years have shown a definite trend toward increased production by governments and contractors, formerly referred to as "noncommercial operations."

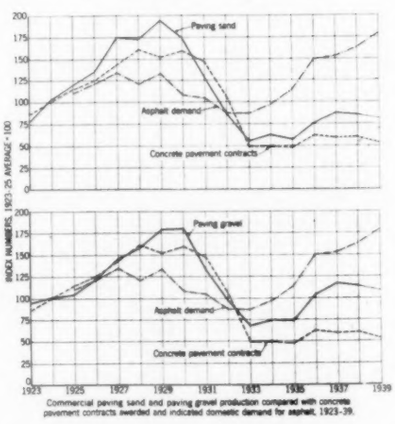
There has been a tremendous increase in the noncommercial production of sand and gravel. Before 1929 less than 5 per cent. of the total tonnage of sand and gravel produced was reported by state highway departments and similar governmental agencies. By 1931 this had risen to 16 per cent., although better means of reporting has made the data for those years not strictly comparable. Since 1932, however, the coverage of the reports obtained has been reasonably comparable for the two types of production. Growth in the use of portable plants parallels very closely the increase in the percentage of sand and gravel produced by noncommercial plants. By 1938 noncommercial production had grown to represent 42 per cent. of the total tonnage.

Of the 76,000,000 tons of sand and gravel reported as produced by governments and contractors in 1938 only 18 per cent. was washed or screened. The rest was unprepared material having an average reported value of only

*(Continued on page 53)*




**Building sand and gravel production compared with construction and residential contract awards, 1919-39.**


Paving sand
Asphalt demand
Concrete pavement contracts
Paving gravel
INDEX NUMBERS, 1923-25 AVERAGE = 100
1923 1925 1927 1929 1931 1933 1935 1937 1939

**Paving sand and gravel production compared with concrete-pavement contracts and asphalt demand, 1923-39.**

# An Outstanding Southern California Gravel Plant

**By W. E. Trauffer**

The 2½-cubic yard drag-line cleaning up at one end of property. Main belt-conveyor and plant are in background.

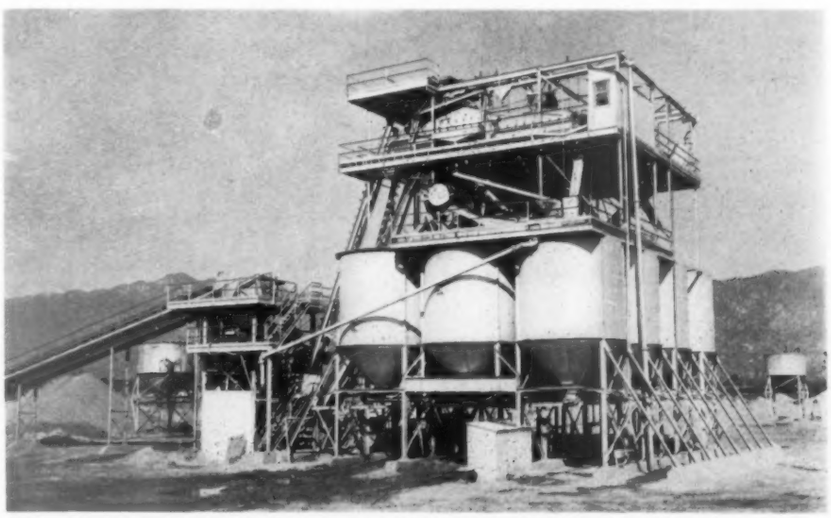
THE Blue Diamond Corporation, Ltd., Los Angeles, operates at El Monte, California, one of the best of a group of plants in the San Gabriel and San Fernando Valleys, which probably know no equal for low-cost production of specification sand and gravel. The intense competition in the Los Angeles area and the inexhaustible deposits abounding in these valleys keep prices at what is probably the lowest level, year in and year out, known in this country. The low prices and competition and the many sizes and types of material in demand have forced local producers to incorporate the most modern and efficient equipment and design in their plants.

The Blue Diamond plant went into operation during the summer of 1937, replacing a smaller plant near the same location. The new plant has an average capacity of about 250 tons per hour. Like many of the other plants in this area it is actually a dual operation, producing both crushed and uncrushed gravel. The plant is built entirely of steel and concrete and has unusual flexibility. It is designed so that any of the many grades of sand, gravel, and crushed gravel (or rock as it is known in this part of the country) can be produced in almost any desired proportion of the total production without unbalancing the plant or necessitating the wasting of other products. Sizeable stock-piles of the various materials produced also help make it possible to meet any demands. According to W. G. Bradley, vice-president of the company, who is in general charge of all operations, the plant is gradually being balanced so that the stock-piles are seldom called on for this reason.

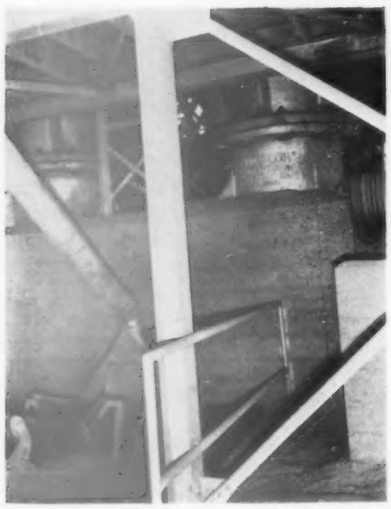
The efficiency of this plant is evident from the small crew required to operate it. One man operates the drag-line, one watches the conveyors and another the plant. A scale man loading the trucks is the only other worker actually required for capacity operation of the plant, of which Bob Reeves is superintendent.

The deposit is typical of the dry river-bed deposits in this valley; having only a small amount of overburden and little or no foreign matter in the deposit. About a foot of the top soil containing grass roots is removed by an International tractor and bulldozer. The remainder of the over-burden is caved in with the sand and gravel. The deposit averages about 30 per cent. sand, and about half of the gravel is over 1½ inches in size with some bowlders as large as 12 inches in diameter.

At an average depth of 30 feet below the surface there is a 2-foot layer of clay. Several methods of excavation were tried and the most satisfactory of these is now in use. A Link-Belt electric drag-line, with a 60-foot boom and a 2½-cubic yard Page automatic drag-line bucket, loads the material into the field hopper of a belt-conveyor system. This consists of a main conveyor running to the plant at the end of which, and at right angles to it, is a field conveyor which is extended in either direction as operations progress. The gravel is first excavated to the clay level in a long strip about 150 feet wide. When the plant is shut down, or outside regular operating hours, the drag-line strips off the clay and casts it back into the worked-out section of the pit. This requires about 8 hours weekly. The drag-line then works back over the same strip, digging another 30-foot layer. About 15 feet of this is usually under the ground-water level, which varies with the dry and rainy seasons. When digging the top layer, operations are conducted entirely in the daytime. When digging under water level, the material is excavated at night and left to drain in piles, from which it is recovered by the day shift. At the time



The processing plant with scalping and crushing building at left. In foreground is the truck-scale house.



The two crushers with conveyor and dust-collecting hood in foreground.

of the writer's visit to this operation the second parallel cut had been completed and a short cut was being made to the property line on the south side of the main belt before the third long cut to the north was started.

The field hopper has a capacity of 4 cubic yards and it and the 20-foot conveyor sections are moved by the drag-line when the 36-inch lateral conveyor is extended or shortened. This conveyor is operated in lengths of from 40 to 460 feet with three 20-feet conveyor sections being added or taken away at one time. Material is discharged from the field hopper on the lateral conveyor by a Conveyor Company reciprocating-plate feeder of unusual design. Counterweighted fingers suspended above the discharge opening help to regulate the feed. Grizzly bars extending from the end of the feeder plate let minus 1½-inch material drop first on the belt-conveyor to cushion the fall of the larger gravel and bowlders. Conveyor Company idlers and Goodyear belting are used on all the conveyors.

The 36-inch main belt-conveyor is extended as each cut is made and is now 500 feet long. About half of its length is in the pit and half is inclined to the plant. A small hopper on the pit end of this conveyor receives the material from the lateral conveyor. At the plant the material is discharged on a 4-foot by 10-foot Allis-Chalmers 2-deck Low Head screen which acts as a scalper, splitting the material to the two sides of the plant. The size of the largest opening used on the top deck of this screen is varied from 1¼ inches up to 3½ inches, depending upon the products desired. Two sizes of openings are used on each deck. Usually ⅜-inch by ⅜-inch cloth is used on the first half of the bottom deck and 1½-inch cloth on the second half. The material going through part of the first half of this deck is wasted and usually

Looking down on conveyor, scalping screen, crushers and gravel elevator.

amounts to about 20 tons per hour. This drops into one compartment of a hopper under the screen in which water is added. A 4-inch Kimball-Krogh pump moves this sand to a waste pile in the pit.

The material passing through the 1½-inch section drops into another compartment of the hopper from which it is fed to the sand-and-gravel department to be described later. If the material from the pit is very dry it can be screened more easily and more than 20 tons per hour will be diverted to waste. A flop valve makes it possible to divert this excess into the sand-and-gravel flow. This system also makes it possible to allow for any variations in the raw material and as much as 40 tons per hour can be wasted if necessary. The gravel passing over each of the two decks goes to separate 36-inch Traylor TY gyratory crushers, whose openings are varied as required. The products of both crushers are discharged on a 24-inch by 30-foot belt-conveyor followed by a 90-foot belt-bucket elevator which feeds the crushed-gravel screens. The 4-foot by 14-foot Allis-Chalmers 2-deck preliminary screen has ¾-inch wire cloth on its top deck and three separate sizes of cloth on the bottom deck. The four sizes usually made are No. 3, No. 4 and No. 5 crushed gravel and dust and these are discharged into bins.

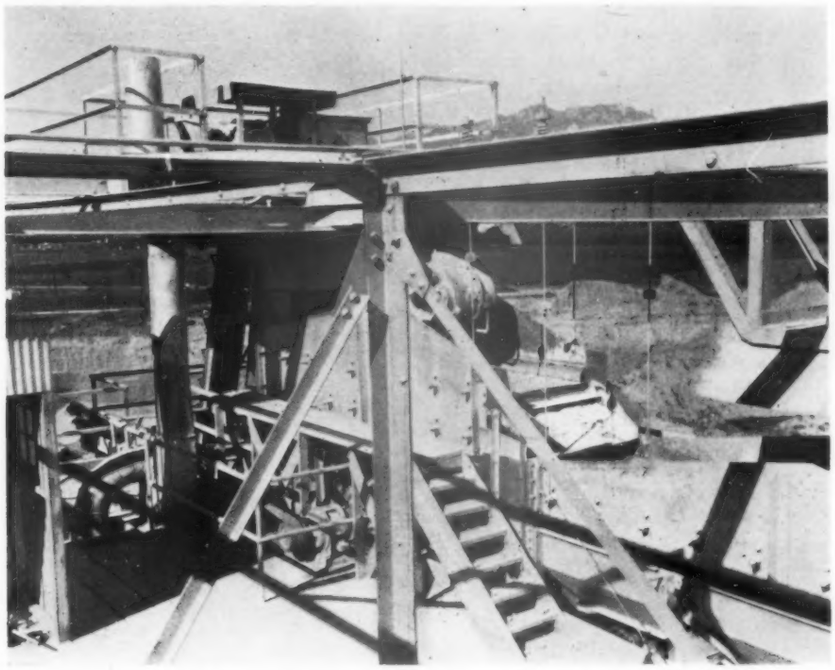
The material passing over the top deck goes to a 1-deck 4- by 14-foot Low Head screen which can be used to make any size of crushed rock up to No. 1 (2½-inch). At present one third of the deck is used for a No. 3 product, the remaining material dropping into a 30-ton interstice bin from which a 24-inch by 50-foot belt-conveyor feeds it back to the second Traylor crusher. The finished sizes of crushed gravel are stored in 4 of the 12 circular storage bins and dust is stored in one of the bins and in another of the 6 interstitial bins.

The minus-1½-inch material passing through the bottom deck of the scalping screen is discharged to a second 90-foot-centers belt-bucket elevator feeding the washed sand-and-gravel department. The preliminary sizing is done by a 4- by 10-foot 2-deck Allis-Chalmers Low Head screen. The material passing through the bottom deck goes into a sand-dewatering hopper with movable partitions. When concrete sand is desired 5/16-inch wire cloth is used on the

The drag-line moving pit hopper into new position. At left the hopper is being lifted. Center view shows hopper being moved. At right hopper is being deposited in new position on opposite side of pit conveyor.

top deck and $\frac{3}{16}$-inch cloth on the bottom deck of this screen. Because finer sand tends to go through the screen first the partition at the discharge end can be adjusted to cut out some of the coarser sand, if the pit material happens to be running coarse. When roofing gravel is being made instead of concrete sand the partition at the feed end can be adjusted to reject some of the finer sand. When plaster sand is being made wire cloth with ¼- and ⅛-inch openings is used on the top and bottom decks respectively. Similar hoppers with movable partitions under the gravel and stone screens make possible close control of gradation of their products.

Whichever kind of sand is being made is discharged from the dewatering hopper into a 4- by 20-foot sand-drag from which the product can be discharged into either of 2 plant bins or on a short belt-conveyor feeding a third bin. Usually all three bins are used to store concrete sand. Plaster sand is made only occasionally in 3,000-ton batches. At such times one of the three sand bins is filled with plaster sand which is at once transferred either to stock-piles or into a yard bin. This plant bin is then again used for concrete sand. The overflow from both the dewatering hopper and the sand-drag is flumed into a worked-out section of the pit which is blocked off.



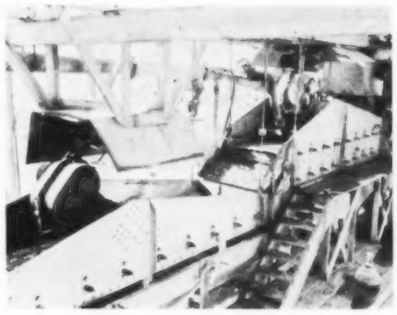
The two 4- by 14-foot double-deck screens used for crushed gravel or rock sizing. At the left is the fan which sucks dust from plant into a cyclone.

Material retained on the bottom deck of the preliminary sizing screen is pea gravel and this is deposited in a bin. The ¼- to 1½-inch gravel passing over the top deck of this screen goes on a 4- by 14-foot 1-deck Low Head screen which does the gravel sizing.

All the screens are suspended by cables from coil springs attached to steel beams and transmit no vibration to the plant. The four rock and gravel sizing screens are high enough above the bins so that any size of material coming from any of them can be stored in any of the bins. This arrangement makes possible any desired blending of either material or combinations of both materials. It also makes possible the adjustment of production to the demand for either type of material.

The storage system consists of 12 circular, conical-bottom steel bins in 3 rows of 4 each which, with their star bins, or interstices, have a combined capacity of about 2,000 tons. Clam-shell gates are used under the gravel bins. Under the sand bins are sliding gates with slotted inserts which allow the bins to drain in 12 hours. The slots are $\frac{1}{16}$-inch wide at the top and taper wider toward the bottom to prevent clogging. The water from all the gates is flumed to the waste pond.

Extending under the center row of bins for their full length is the 100-foot platform of a 100,000-pound capacity Buffalo truck scale. This long platform makes it possible for the weigh man to load a truck or trailer from any of the four bins in this row or from any of the six interstitial bins and weigh it without moving the truck from its position. Attached to this scale is a Howe Weightograph, which is equipped with a device that projects the scale reading on a large screen at the end of a tapered box. With this system the weigh-man can read the scale at any loading point in this row and stop the load at any desired weight without moving from his post.



The two 4- by 14-foot double-deck screens used for sand-and-gravel sizing.

This plant was designed by the company's engineering staff under the direction of W. G. Bradley, vice-president, who also supervised its construction. He is also responsible for some of the refinements of design in the plant. One of the most interesting of these is the sand-drag, which was made in the company's shops. This machine is similar to the drags in common use, but the scrapers are 4-inch angle-irons attached to a rubber belt. The pulleys used are actually cages made with oval bars welded to the end disks. These bars contact the belt and allow pieces of gravel to slide through which might damage the belt if an ordinary flat pulley were used.

Another interesting item is the dust-collecting system, which is connected to both crushers and the rock elevator. A 35-inch Buffalo fan sucks dust from these points through a 7-foot diameter cyclone. The dust is deposited into one of the dust bins. No record is kept of the amount of dust collected, but this system keeps the plant clean even during dry seasons and is so effective that the crushed-rock screens, which are not connected to it, are almost dustless.

Deliveries are made almost entirely in the company's own trucks, and 22 of the fleet of 51 dump trucks and truck-trailers are usually kept busy de-

(*Continued on page 46*)

Close-up view of the hopper with movable partitions under the gravel screen.

# Sand-and-Gravel Industry Gets Provisional Seasonal Exemption

BY a provisional finding and determination of Harold Stein, the authorized representative of the administrator of the Wage and Hour Division of the United States Department of Labor, the northern branch of the sand-and-gravel industry has been declared to be seasonal within the meaning of Section 7 (b) (3) of the Fair Labor Standards Act of 1938. The finding was dated January 8 and was made public first by a very brief announcement over the radio. Final release of the decision was made on January 16 while the Board of Directors of the National Sand & Gravel Association was in session at the Jefferson Hotel, St. Louis. Permission to file a petition objecting to the decision was given by a notice dated January 16 to all persons who felt themselves aggrieved by it, the 15-day period allowed by the act expiring January 23.

The National Crushed Stone Association, at the opening session of its convention at St. Louis January 22, decided to file a protest for a review of the finding by Mr. Stein, for a re-opening of the proceedings dealing with the application of the National Sand & Gravel Association for seasonal exemption, and for a further hearing for the purpose of presenting additional evidence. The National Sand & Gravel Association filed a separate petition for exemption, and a similar claim as to seasonality was made on behalf of the crushed-stone and industrial-sand industries by the National Crushed Stone Association and the National Industrial Sand Association, respectively.

In brief, the provisional findings and determination state that there is a definite branch of the sand-and-gravel industry designated as the northern branch, occupying areas "in which the average temperature during the months of December, January and February, is 25 degrees F. or less," where "the length of the operating season varies indirectly though not precisely with normal winter temperatures," and where over 90 per cent. of sand-and-gravel production takes place within a 6-month period.

The findings and determination are reprinted in detail at the close of this article, together with the appendix which defines the area characterized as the northern branch. The accompanying map, prepared by PIT AND QUARRY's editorial staff, shows the counties affected by the decision.

The decision means that under the Fair Labor Standards Act employees of the northern (seasonally-exempted) branch of the sand-and-gravel industry may be employed, for a period or periods of not more than 14 work-weeks in the aggregate in any calendar year, as much as 12 hours daily or 56 hours weekly without the payment of the time and one-half for over-time which otherwise applies. When the final exemption is granted, as explained by V. P. Ahearn, executive secretary of the National Sand & Gravel Association, the employer may select any 14 work-weeks in the calendar year and they need not be consecutive. A work-week with respect to any employer means 7 consecutive days, provided that the work is not changed for the purpose of evading the act. If an employer elects to pay overtime compensation in any particular work-week, or if no overtime is worked during such work-week, that work-week is not to be counted in the 14 exempt work-weeks. Where the employees work overtime for more than 14 work-weeks, the first 14 work-weeks in which overtime is worked, and for which they do not receive overtime compensation at the regular pay periods, will be deemed to have been claimed by the employer under the exemption.

A complete copy of the decision and the appendix follows.

IN THE MATTER OF APPLICATIONS OF NATIONAL SAND AND GRAVEL ASSOCIATION AND SUNDRY OTHER PARTIES.

For the exemption of the dredging and excavating of sand and gravel from surface or open-cuts from the maximum hours provisions of the Fair Labor Standards Act of 1938 as an industry of a seasonal nature, pursuant to Section 7(b)(3) of the act and Part 526 of regulations issued thereunder.

*Findings and Determination of the Presiding Officer.* January 8, 1940.

"The National Sand & Gravel Association and sundry other parties having filed a petition with the Administrator for the exemption of the dredging and excavating of sand and gravel from surface or open-cuts, and necessary milling activity incident thereto, from the maximum-hours provisions of the Fair Labor Standards Act of 1938 as an industry of a seasonal nature pursuant to Section 7(b)(3) of the act and Part 526 of the regulations issued thereunder, the administrator gave notice of a public combined hearing on several surface or open-cut mining industries to be held at the Raleigh Hotel, 12th Street and Pennsylvania Avenue, N. W., Washington, D. C., to commence at 10 o'clock a.m., June 19, 1939, before the undersigned as presiding officer.

"Pursuant to notice the undersigned convened the hearing and an opportunity was afforded to all who appeared to present testimony and to question witnesses through the presiding officer. Appearances were entered for and against the application and by agreement supplementary data were filed subsequent to the hearing.

"The dredging and excavating of sand (but not industrial sand)[1] and gravel from surface or open-cuts were defined in the notice of hearing to mean the extraction of such sand and gravel from pit, bank or marine deposits by hand or power methods, including the necessary milling activities incident thereto but not embracing any underground operations.

"The present findings relate solely to sand and gravel and not to any of the other industries included within the general scope of the hearing.

"The National Sand & Gravel Association appeared in support of the application on behalf of all commercial sand-and-gravel producers in the United States. Its own membership produces 65 per cent. of the total. Much of the evidence presented by the association was obtained from questionnaires circulated to all commercial sand-and-gravel companies.

"The American Federation of Labor appeared in opposition to the application.

"Sand and gravel are excavated from banks or pits by the use of power shovels, drag-lines, power scrapers and slack-line cableway excavators. Marine deposits are usually excavated by means of pump dredges, ladder dredges or dipper dredges. The products are then put through a plant which sizes, washes, and grades them. After treatment they may be shipped or stock-piled.

"It seems to be a general practice to ship from the stock-pile both during the production season and during the season when production is suspended. Shipments from the stock-pile during the season in which no operations are carried on are not considered part of production by the applicants.

"Sand and gravel are among the more important forms of aggregates which find use in the construction industries.

"Since construction specifications normally call for washed sand and gravel, there is virtually no commercial market for unwashed sand and gravel. In fact, the applicants consider water one of the materials necessary for the production of the commercial product.

"The treatment plants, invariably unheated and frequently open, are situated either adjacent to the excavation or located a mile or so away. In the latter case, the material is transported from the site of excavation to the plant by barge, truck, train or conveyor. Wherever located, the treatment plant is always operated as an integral part of the excavating operation.

"Sand-and-gravel operations are conducted throughout the entire United States. Because the products are of low value per unit of volume and weight, long hauls from the treatment plant to the point of use are impractical. The average land haul was said to be 45 to 50 miles, and the average water haul approximately 30 miles. Thus, sand-and-gravel plants are competitive only within rather narrow territorial limits.

[1] "Industrial sand" on which testimony was taken at the hearing but which is not considered in this determination includes glass, molding, grinding and polishing, fire, furnace and engine sand.

"In addition to a very large number of very small sand-and-gravel operations with an unknown volume of employment and production, there were in 1935 almost 1,800 commercial operations listed by the 1935 census, with products valued at $54,000,000 and employment during the peak months of 10,000 wage earners. There were also a considerable number of non-commercial operations, *i.e.*, for the most part, operations conducted by various governmental agencies for the production of sand and gravel for use on their own projects, and not for sale.

"Sand-and-gravel operations in the United States take place during a season ranging from approximately 4 months to 12 months. During this period, of course, at least some of the operations are interrupted by inclement weather in addition to such interruptions as may be caused by break-down of machinery, etc.

"It is clear from data submitted by the applicants that in those areas of the United States that have comparatively cold winters (in general the more northerly areas) sand-and-gravel plants shut down and cease operations for an extended period. More specifically, in those areas in which the average temperature during the months of December, January and February is 25 degrees F. or less, over 90 per cent. of all sand-and-gravel production takes place within a 6-month period, and all but a negligible amount is produced within 7 months. Thus, sand-and-gravel operations are substantially shut down for 6 months and completely shut down for about 5 months. This shut-down is primarily caused by: (1) the impracticability of excavating frozen sand and gravel; and (2) the impracticability of washing sand and gravel after excavation in freezing weather. In a practical sense, the materials excavated, handled and processed by the industry are unavailable in the form in which they are normally excavated, handled and processed, *i.e.*, as unfrozen sand and gravel. It may be noted that there is a concurrent falling off in demand because of construction specifications, but this does not appear to be a determining factor. The length of the operating season varies directly though not precisely with normal winter temperatures, but complete winter shut-down of all plants does not occur beyond the 20-degree to 25-degree average December-February temperature zone. Thus, in a general way, under the effect of similar climatic factors, there is a northern branch of the sand-and-gravel industry that conforms to the requirements set forth in Section 526.3 of the regulations. The southern branch, on the other hand, does not conform to these requirements. Many of its plants do not shut down at all and there is no normal shut-down of any extended period. Such cessation as may exist is caused rather by a falling off in demand than by the effect of climatic factors on the availability of materials.

"The line between the northern and southern branches, as defined above, can not be drawn for practical purposes with mathematical exactitude. It is impractical, for example, to define the northern branch as including all plants that lie in the isothermic belt below 25 degrees on Fig. 5 of the Atlas of American Agriculture prepared by the United States Department of Agriculture because this map is not generally available and also because it does not readily lend itself to this type of reference use. Furthermore plants immediately outside this belt frequently are subject to approximately the same climatic factors as plants immediately within it. Therefore, to give practical effect to the statutory exemption, I find it necessary and desirable to include within the northern branch of the industry all plants in all counties within the belt or touched by the 25-degree isotherm. A list of such counties will be found in Appendix A.[2] The available information in the record indicates that the northern branch of the industry as thus defined will include all plants that shut down substantially for about 6 months or more, and completely for about 5 months or more, because freezing weather makes unfrozen sand and gravel unavailable during the shut-down period. However, since the evidence in the record does not entirely preclude the possibility that some plants or groups of plants outside the above-defined geographical area do in fact operate in the same manner and for the same reasons as the typical plant in the northern branch described in the preceding paragraph, I find that a supplementary determination should be made for such plants or groups of plants, if any, upon a proper showing of facts.

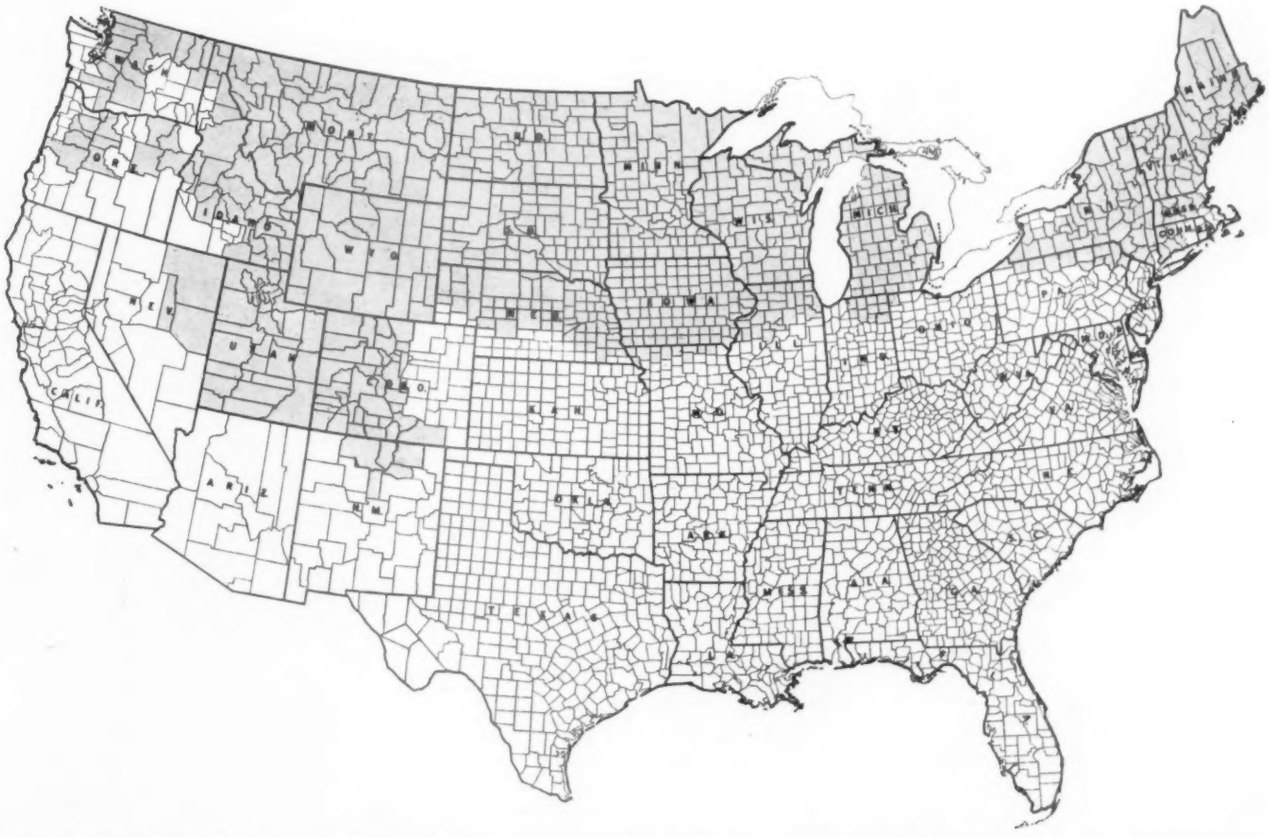
"On the whole record I find and determine that:

"1. There is a branch of the sand-and-gravel industry (as defined herein) wherein the plants normally shut down for about 6 months each year, except for an insubstantial amount of production that may be produced shortly before or shortly after the main production season. This branch is located in the colder and, in general, more northerly parts of the United States; and

"2. There is a southern branch of the industry wherein the plants do not shut down at all or do not normally shut down for a substantial period each year; and

"3. The plants in the northern branch cease operation annually at a regularly recurring season of the year, except for sales, maintenance, and similar work, because the materials used by the industry are not available for excavation, handling and processing in the form in which they must be excavated, handled, and proc-

[2] [The counties comprising the northern branch of the industry are shown by the shaded area on the map below.—Ed.]




Map of United States showing by shaded areas the states and counties in which the sand-and-gravel industry has been granted provisional seasonal exemption under the Fair Labor Standards Act of 1938.

essed, *i.e.*, as unfrozen sand and gravel, because of climatic factors; and

"4. The northern branch of the sand-and-gravel industry is an industry of a seasonal nature within the meaning of Section 7(b)(3) of the act and Part 526 of regulations issued thereunder; and

"5. The southern branch of the sand-and-gravel industry is not an industry of a seasonal nature within the meaning of the act and the regulations; and

"6. For the purpose of this determination the northern branch of the sand-and-gravel industry shall mean the excavation of sand and gravel, but not industrial sand, from open cuts, including necessary milling operations incident thereto; and

"7. For the purpose of this determination the northern branch of the sand-and-gravel industry shall include all plants located in counties that lie within the isothermic belt below 25 degrees F. or are touched by the 25-degree isotherm on Figure 5 of the American Atlas of Agriculture issued by the United States Department of Agriculture. The said counties are listed in Appendix A attached hereto and incorporated herewith by reference.

"8. This determination shall be without prejudice to a supplementary determination enlarging the scope of the northern branch by the inclusion therein of such plants or groups of plants, if any, as operate in the same manner and for the same reasons as the plants in the northern branch described in paragraphs 1 and 3 above.

"Whereas, said findings and determination were duly filed with the administrator on January 8, 1940, and are now on file in Room 5144, Department of Labor Building, Washington, D. C., and available for examination by all interested parties:

"Signed at Washington, D. C., this 8th day of January, 1940.

"HAROLD STEIN,
*Presiding Officer.*"

APPENDIX A

A. All counties in the states of:

| | |
|---|---|
| Iowa | South Dakota |
| Maine | Utah |
| Minnesota | Vermont |
| Montana | Wisconsin |
| New Hampshire | Wyoming |
| North Dakota | |

B. All the counties in the State of Colorado except the counties of:

| | | |
|---|---|---|
| Adams | Elbert | Prowers |
| Arapahoe | Kiowa | Pueblo |
| Baca | Kit Carson | Sedgwick |
| Bent | Lincoln | Washington |
| Cheyenne | Logan | Weld |
| Crowley | Morgan | Yuma |
| Denver | Otero | |
| Douglas | Phillips | |

All the counties in the State of Connecticut except the counties of:

| | |
|---|---|
| Middlesex | Tolland |
| New London | Windham |

All the counties in the State of Idaho except the counties of:

| | | |
|---|---|---|
| Ada | Latah | Owyhoe |
| Benewah | Lewis | Payette |
| Canyon | Lincoln | Twin Falls |
| Gooding | Minidoka | |
| Jerome | Nez Perce | |

All the counties in the State of Michigan except the counties of:

| | |
|---|---|
| Berrien | Monroe |

All the counties in the State of Nebraska except the counties of:

| | | |
|---|---|---|
| Adams | Frontier | Nuckolls |
| Banner | Furnas | Pawnee |
| Buffalo | Gosper | Perkins |
| Chase | Hall | Phelps |
| Cheyenne | Harlan | Redwillow |
| Clay | Hayes | Richardson |
| Dawson | Hitchcock | Thayer |
| Deuel | Jefferson | Webster |
| Dundy | Kearney | |
| Franklin | Kimball | |

All the counties in the State of New York except the counties of:

| | | |
|---|---|---|
| Genesee | Niagara | Suffolk |
| Monroe | Orleans | Wayne |
| Nassau | Seneca | Westchester |

all the counties of the City of New York

C. The following counties in the following states:

*State of Illinois:*

| | | |
|---|---|---|
| Boone | Kendall | Putnam |
| Bureau | Knox | Rock Island |
| Carroll | Lake | Stark |
| Cook | La Salle | Stephenson |
| De Kalb | Lee | Warren |
| Du Page | Mc Henry | Whiteside |
| Henderson | Marshall | Will |
| Henry | Mercer | Winnebago |
| Jo Daviess | Ogle | |
| Kane | Peoria | |

*State of Indiana:*

| | | |
|---|---|---|
| Allen | Lagrange | Steuben |
| Dekalb | Marshall | Whitley |
| Elkhart | Noble | |
| Kosciusko | Saint Joseph | |

*State of Massachusetts:*

| | | |
|---|---|---|
| Berkshire | Hampden | Middlesex |
| Franklin | Hampshire | Worcester |

*State of Missouri:*

| | | |
|---|---|---|
| Atchison | Mercer | Scotland |
| Gentry | Nodaway | Sullivan |
| Harrison | Putnam | Worth |
| Holt | Schuyler | |

*State of Nevada:*

| | | |
|---|---|---|
| Elko | Eureka | White Pine |

*State of New Mexico:*

| | | |
|---|---|---|
| Colfax | Rio Arriba | Taos |
| Nora | Santa Fe | |

*State of Ohio:*

Williams

*State of Oregon:*

| | | |
|---|---|---|
| Baker | Hood River | Marion |
| Clackamas | Jefferson | Umatilla |
| Deschutes | Lane | Union |
| Grant | Linn | Wasco |

*State of Pennsylvania:*

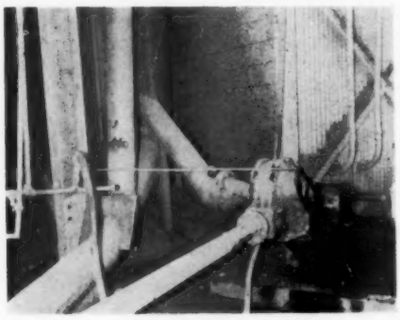
| | | |
|---|---|---|
| Bradford | Pike | Warren |
| Erie | Potter | Wayne |
| Lackawanna | Susquehanna | Wyoming |
| McKean | Tioga | |

*State of Washington:*

| | | |
|---|---|---|
| Chelan | Okanogan | Snohomish |
| Ferry | Pend Oreille | Spokane |
| King | Pierce | Stevens |
| Kittitas | Skagit | Whatoom |
| Lewis | Skamania | Yakima |

## Blue Diamond *(from page 43)*

livering from this plant. This fleet includes 25 Model AC Mack truck-and-trailer combinations which haul payloads of 20 tons each and 20 International and 6 Reo trucks each hauling 10-ton loads. Most of the rehandling of materials and loading from stockpiles is done by a Lima 1½-cubic yard crawler crane powered by a Cummins Diesel engine. A Browning ½-cubic yard gasoline crane mounted on a Mack truck chassis is also used for this purpose. The International tractor used for stripping the deposit is also used to maintain the yard and roadways. Water for all purposes is supplied by an 800-gallon per minute Pacific deep-well pump driven by a 100-horsepower General Electric motor.



**The 4-inch centrifugal pump which sends waste sand into pit.**

In addition to the 51 dump trucks the company operates 15 Reo flat-body trucks for delivering structural and reinforcing steel and other building products. During the summer ready-mixed concrete was added to the company's long list of products and 6 mixers on International trucks were added for this purpose. Under the direction of John T. Abbott, former superintendent of quarries and pits for the Moulding-Brownell Corporation, Chicago, some of the older Mack and International trucks have been converted to use ethyl gas. This has resulted in such an increase in efficiency and economy of operation that it is planned to gradually convert the remainder of the fleet. A complete description of the manner in which this is being done was published in the January, 1940, issue of PIT AND QUARRY, page 66.

**The 1½-cubic yard Diesel-powered crane loading from stock-piles into trucks.**

New crusher building at the Paul Frank Quarries, North Vernon, Indiana, nearing completion.

Stripping the heavy burden which overlies the limestone at the Frank quarry.

# New Plant Under Construction at Indiana Limestone Quarry

AT a limestone quarry located at the edge of North Vernon, Indiana, the Paul Frank Quarries are this winter engaged in erecting a new crushed-stone plant of high capacity and efficient design to replace existing equipment.

Mr. Frank, originally a portable-plant operator, acquired the plant and deposit in 1932. Since that time he has made numerous improvements, and the new plant, designed better to produce stone meeting the exacting specifications of the Indiana Highway Department, is expected to be in full operation by early spring.

Considerable stripping is necessary at the quarry, the overburden running up to 20 feet in thickness and including much oily shale. An Insley ⅜-cubic yard shovel and a Koehring equipped ¾-cubic yard dipper load the spoil into dump trucks for disposal, the Koehring shovel also loading the stone into trucks for delivery to the crusher. Three Autocar dump trucks are engaged in this work, the haul from the quarry to the crusher being about ¼ mile.

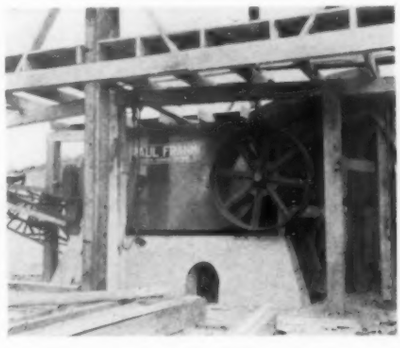
Formerly all the drilling was done with jack-hammers but a new Worthington wagon-drill is to go into service in the spring. Air is supplied by a Worthington stationary compressor.

At the new crusher building the trucks will discharge the stone from an earthen ramp into a 3-foot by 10-foot combination grizzly and feeder, pieces over 2½-inches in size passing to a Pioneer 24-inch by 36-inch overhead-eccentric primary jaw-crusher equipped with SKF anti-friction bearings. A 3-foot by 6-foot single-deck vibrating screen following the primary breaker will bypass the "throughs" direct to a new Pioneer 100-foot by 24-inch belt-conveyor which runs to the screening building, the oversize, along with the stone passing the grizzly, going through a Pioneer 54-inch by 24-inch Timken-bearing double-roll crusher. The product of this secondary reduction machine is discharged to the 100-foot conveyor which carries the crushed stone to the top of the screening structure.

Three triple-deck vibrating screens accomplish the separation, the first gradation being accomplished by a new

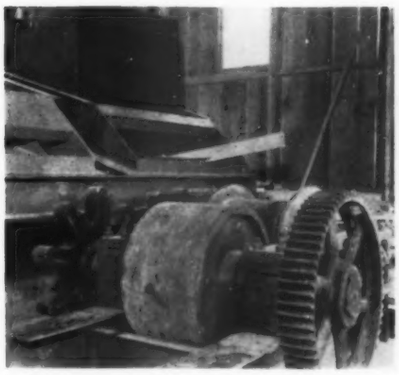
(*Continued on page 49*)

The primary breaker in the crushing building seen under construction.



The secondary crusher in position on its concrete foundation.

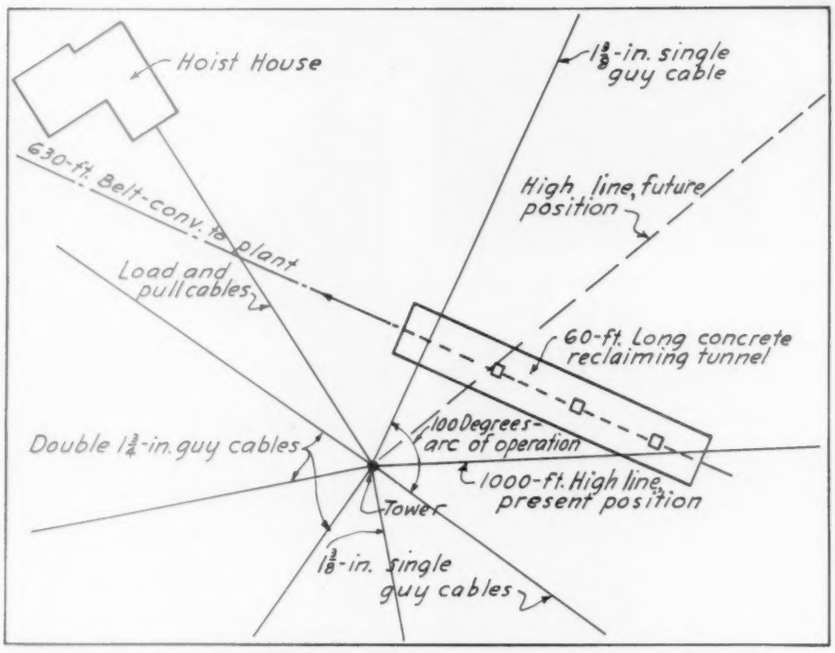
The three vibrating screens being installed in the screening building. Conveyor structure is above.



Roll-crusher in the screening building.

# Cableway-Scraper System Solves California Producer's Problem

By W. E. TRAUFFER




This diagram illustrates the location of the stock-pile reclaiming tunnel with respect to present and future digging operations.

THE Pacific Rock and Gravel Company for many years used a shovel for loading in its pit at Monrovia, California. As in many other operations in this territory a field hopper and pendulum belt-conveyor were used to convey the material to the plant. This plant and conveying system were described in detail in the August, 1936 issue of PIT AND QUARRY, since then no important changes have been made in the plant. Later trucks were used to haul from the shovel to a stationary hopper at the edge of the pit floor from which the material was conveyed to the plant.

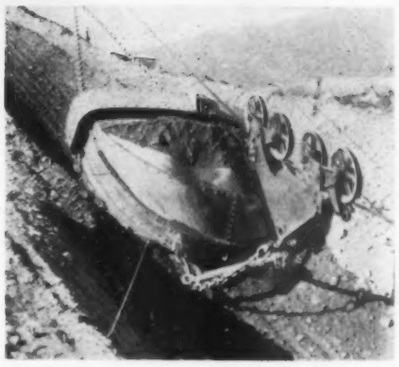
In common with other pits in this section the bank is very steep and occasional cave-ins would partially bury the shovel and cause loading delays. This method restricted excavation of the pit to the ground-water level, which averages about 60 feet below the surface, although good gravel is known to exist to a depth of at least 400 feet. For the above reasons the company in October, 1939 installed a Sauerman cableway-scraper system with a 137-foot head tower and an 8-cubic yard Sauerman Crescent scraper bucket. This system has eliminated pit delays and will be able to excavate to a depth of at least 150 feet. It is expected to lower considerably the cost of delivering this material to the plant and has a capacity far in excess of the present plant capacity of 350 tons per hour. A few changes are to be made in the plant to increase its capacity to about 600 tons per hour, approximating the capacity of the scraper system. The surge stock-pile created makes pit and plant operations independent of each other.

The head tower of this system is located at one side of the plant end of a 60-foot-long concrete reclaiming tunnel. A 1,000-foot span is being used and the 1⅜-inch high line is at present attached to a temporary stationary tail tower. This will be replaced with a 25-foot steel tail tower on skids which will be anchored to a cable attached to two "dead men" 250 feet apart. These will suffice for a long time to come and additional "dead men" will be installed when needed. It is expected that an arc of nearly 100 degrees can be worked from the present location of the head tower.

The 137-foot structural-steel head tower is mounted on a pin fitting into a steel base on a concrete foundation. Three single 1⅜-inch guy cables brace the tower from the pit side. Three 1¾-inch double guys are used on the plant side to take the pull-line load. The double guys are attached to the top of the tower by sheaves and can be readily adjusted as necessary.

The hoist house is located so that it will never be in a direct line with the high-line. The Willamette 3-drum

Left: The 8-cubic yard scraper bucket on its way to the storage pile with a full load. Right: The bucket being returned into the pit by gravity for another load.



The 8-cubic yard scraper bucket with its carrier on the way to the plant with a load.

hoist is attached to timbers which are bolted to a 60-cubic yard concrete base. As further insurance against shifting steel bars extending from the back of the hoist are bolted direct to the base. The hoist is powered by a 300-horsepower General Electric motor. A blower for cooling the drums and a compressor which supplies air for the brakes are operated by 2- and 5-horsepower General Electric motors, respectively.

One drum lightens and slackens the high line which returns the bucket to the pit. This cable runs direct from the hoist over a sheave at the top of the mast, exerting only downward pressure, to a double block-and-tackle arrangement to which the 1⅜-inch high-line is attached. The 1⅜-inch scraper pull line runs from the hoist to a sheave in the bottom of the mast and vertically upward through the center of the mast to a sheave at the top. The 8 cubic yard Crescent scraper bucket is permanently attached by two chains to a 4-wheeled carrier on the high line. When the scraper bucket is hauling a load to the stock-pile the high line is slack. As soon as the load is deposited on the stock-pile the high line is tightened and the bucket is returned by gravity to the pit with the pull line controlling its speed. When the desired spot is reached the pull line is checked and the high line slackened for another load.

The concrete stock-pile tunnel is 12 feet square and 60 feet long and has three openings. At present the stock-pile is over the first hole from the pit end of the tunnel but as the size of the pile is increased and the line of operation is swung the second and third holes will in turn be covered. This system can build a stock-pile 60 feet high with a live-reclaiming capacity of 3,000 tons through any one tunnel opening.

The 300-horsepower electric hoist which operates the scraper. In foreground is the belt-conveyor to the plant.

Reciprocating plate feeders discharge the sand and gravel on the 28-inch tunnel belt-conveyor which extends a distance of 630 feet to a 50-ton surge hopper near the plant. This hopper formerly received the discharge of the conveyor from the pit. Link-Belt conveyor idlers are used on the tunnel conveyor which has a gravity take-up.

This view shows the arrangement of the belt-conveyor, tunnel, tower and hoist house.

## Paul Frank

(from page 47)

Pioneer 4-foot by 10-foot unit. This screen scalps off the material larger than 2¼ inches, passing it *via* a chute to a 16-inch by 26-inch set of Diamond rolls in closed circuit with the 100-foot conveyor. Material retained on the second and third decks is passed through split chutes to two 4-foot by 8-foot triple-deck vibrators—one a Pioneer, the other a Diamond—for washing and final separation. Dust and particles smaller than $^{3}/_{16}$ inch are removed at the first screen and are discharged to a bin below, the product being sold for agricultural purposes.

The portable loader. Screen house in background.

Normally the second and third screens will wash and separate the material into the following four sizes: 2¼, 1½, ¾, and $^{3}/_{16}$ inches, discharging into four storage bins. The bins, including the agstone compartment, have a total capacity of about 300 cubic yards and are equipped with manual gates for loading motor trucks. About 50 per cent. of the finished stone is stock-piled in open storage about the plant, being rehandled for shipment by a Barber-Greene loader.

All the fixed machinery is to be electric-motor driven with purchased power.

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The William May Sand and Gravel Company, Ft. Wayne, Indiana, is going into the concrete-products business, making vibrated masonry units. It is building a new plant, equipping it with a Stearns Joltcrete machine with a capacity of seven 8- by 8- by 16-inch units per minute, a Stearns 18-foot mixer and complete kiln equipment.

Complete view of the Meshberger plant with crushers at right. Quarry visible, across ravine, in distance.

Diesel engine which drives primary crusher.

Another Diesel drives the secondary crusher.

A view of both gyratory crushers.

# Crushes 50 Tons of Stone per Hour at Fuel Cost of 40 Cents

ABOUT 100,000 tons of crushed stone is being produced annually at the Columbus, Indiana, plant of Meshberger Brothers Stone Company. Two large gyratory crushers which handle all the stone are powered by two Diesel engines which operate on a total of about 4 gallons of 9-cent fuel oil per hour. Practically all the output is used for state highway construction and maintenance.

In the quarry drilling is done by a Bucyrus-Armstrong well-drill and jackhammers, an Ingersoll-Rand portable compressor supplying the air. Ensign-Bickford safety fuse and Trojan explosives are being used to blast out the limestone. A Lorain 75-B gasoline shovel loads the stone in the quarry and is also used to handle finished stone in open storage around the plant. Four International dump-trucks are available to haul stone from the quarry to the crusher platform, the primary reduction machine being a 16-inch Allis-Chalmers Superior McCully crusher. A Caterpillar D11000 Diesel engine drives this crusher and a 24-inch, 160-foot belt-conveyor carries the stone up to the screening building.

Truck-mounted well-drill at quarry.

A five-section revolving screen, 4 feet in diameter and 20 feet long, scalps out the oversize and accomplishes most of the sizing, pieces larger than 2¼ inches being chuted to an 18-inch, 150-foot belt-conveyor leading back to a No. 6 Allis-Chalmers gyratory secondary crusher driven by a Caterpillar D8800 Diesel engine. The product of this crusher is also fed to the 160-foot conveyor running to the screening tower. The revolving screen is fitted with a dust jacket over the first section to take out the fines, ranging from dust to 3/16-inch, which are sold for agricultural use. A triple-deck vibrating screen is also used at times for special sizing although road stone is usually manufactured and is stored in four truck-loading bins beneath the screens. Washing is accomplished during screening, water being pumped from a creek which separates the plant site from the quarry. The pump, screens and conveyors are powered by individual International gasoline engines. Much of the finished product is piled in open storage and is

(*Continued on page 57*)

**By IRVING WARNER**
**Vice-President, Warner Company**
**Philadelphia**

# Analysis of Recommended Simplified Practice for Coarse Aggregates*

IN the preparation of the Simplified Practice Recommendation for Coarse Aggregates, (United States Bureau of Standards R163-39) and in the approval of those specifications by the producers, an important point seems to have been completely overlooked. The general principle of simplified practice is good but there is a detail which will make these products difficult to produce and probably cause an erratic grading which will be a disservice to the user.

A certain principle is carried through these specifications. Materials bearing alternate numbers are intended to be paired together to form a complete coarse aggregate. It is apparently presumed that the plant will produce these two materials simultaneously by a single screen separation at the theoretical point of division. The principle is generally carried through the specification that the larger aggregate is specified at 0/15 per cent. passing this theoretical point of division and the smaller material specified 90/100 per cent. passing.

Consider the case of Number 3 and Number 57 which will be a generally acceptable combination of sizes for concrete pavements. The theoretical dividing screen is 1-inch. Number 3 specifies 0/15 per cent. passing 1-inch. Number 57 specifies 90/100 per cent. passing 1-inch.

It must be inferred that the Simplified Practice Committee believed that the producer could use a 1-inch square screen in his plant and thereupon could safely and continuously produce a Number 3 aggregate with less than 15 per cent. tramp undersize, that is the percentage passing the 1-inch screen. With a new screen the Number 57 would show 100 per cent. passing 1-inch, but as wear or wire displacement took place with age, the 90/100 per cent. specification for the Number 57 would give the necessary margin of safety.

It is submitted that a properly equipped plant, operated at a generally acceptable rate, can not produce a material which will safely and continuously show less than 15 per cent. passing a test screen of the same size as the plant screen over which the material is screened.

It must here be noted that a producer may not safely approach the limit of a specification. Subsequent to its production at the plant the material is subjected to much abuse from bad handling, segregation, breakage, etc. Correct sampling is difficult and is too frequently done by inexperienced young men who may be quite impractical and over-conscientious.

If a specification says a 15 per cent. limit, then the producer is well advised not to let his product go out at more than 10 per cent. An outside limit is 12 per cent. and this figure is used herein in further discussion. When Number 57 says 90/100 per cent. passing 1-inch, then an irreducible safe minimum is 92 per cent., and 94 per cent. would be much safer.

In order to make a practical check detailed tests were made in the Van Sciver Plant of the Warner Company. The raw material of this plant is a hard, clean gravel, uniformly graded by nature with no preponderance of one size which causes production troubles.

The gravel is first limited by crushing and screening at 2⅛ inches round. The gravel, freed of sand and some of the grit, is fed to two banks of screens. Each bank receives a momentary maximum of 300 tons per hour, the average being less.

Each bank consists of a 6-foot by 19-foot rotary screen equipped with 1¼-inch round plate throughout its length. The tailings then go over a 4-foot by 8-foot vibrating screen which also has

Irving Warner

*Paper presented at the 1940 convention of the National Sand & Gravel Association.

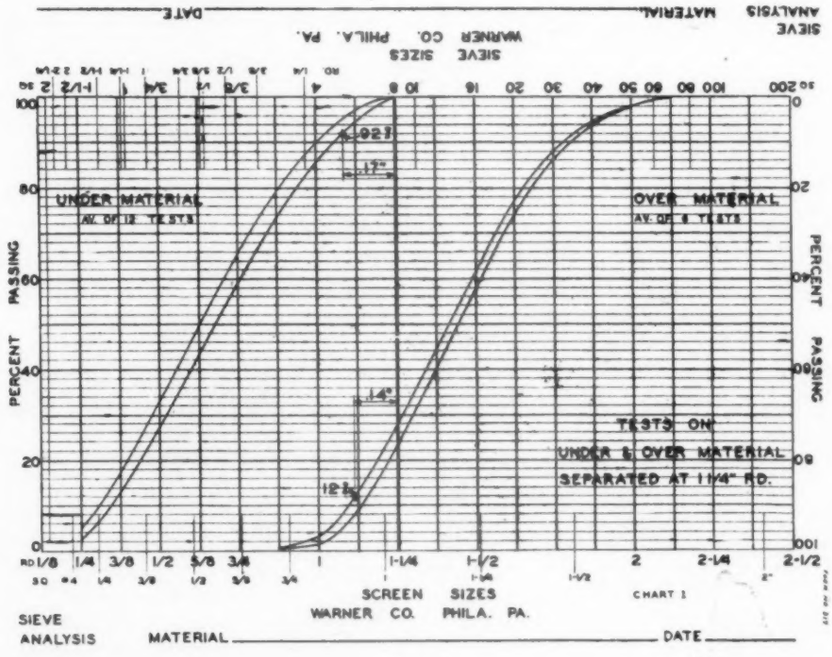



Chart 1

a 1¼-inch screen. This plate is very thin, only ⅛ inch, in order to secure more efficient screening. The rotary screen passes roughly 180 tons per hour, tailing 120 tons to the vibrator, which in turn passes a small additional amount of about 10 tons per hour.

On Chart I are shown the graphs of the over- and under-materials thus made. Those familiar with graphing will recognize that this screening job at 1¼-inch round is unusually efficient. Note the abruptness of the graph of the under-material as it approaches the 1¼-inch limit and the complete absence of the long "goose neck" at the top that is characteristic of most aggregates.

In the case of the larger material the percentage smaller than 1¼-inch, runs from 23 to 28. Tests were made at close steps of 1¼-inch, 1⅛-inch, 1-inch, ⅞-inch and ¾-inch to ascertain the exact graph. On the larger material six tests were made under normal varying operating conditions, and the double graph shows the upper and lower limits of the six tests.

Taking necessarily the least favorable graph, it is to be noted that the curve passes the 12 per cent. line at a point which scales 0.14-inch smaller than the 1¼-inch screen used in the plant. In effect this means, that, so far as this plant is concerned, in order to hold down to 12 per cent. or less on any size screen in this magnitude (say 1-inch square) the actual screen used in the plant must be larger than the specified screen by at least 0.14-inch. As the screen wears, the margin obviously becomes safer.

Consider next the under-material. It is to be noted that the less favorable graph passes 92 per cent., the lowest safe limit, at a point 0.17-inch smaller than the 1¼-inch through which the material is screened. This means that the producer may use a screen, when old and worn, up to 0.17-inch larger. Obviously the new screen must start in smaller to allow for wear.

Thus, theoretically, we have the following figures:

| | Inch |
|---|---|
| To make the under-material right, the screen may not be larger than that specified by more than | 0.17 |
| To make the over-material right the plant screen must be larger than that specified by at least | 0.14 |
| Margin for wear, etc | 0.03 |

Obviously this net tolerance of 0.03 inch is insufficient for safe production.

There is a modification of the above data which helps the situation to a moderate degree, but insufficiently to solve the problem. It is evident that the upper limit of the larger material tested is rather low. To compare to Simplified Practice Number 3 the upper

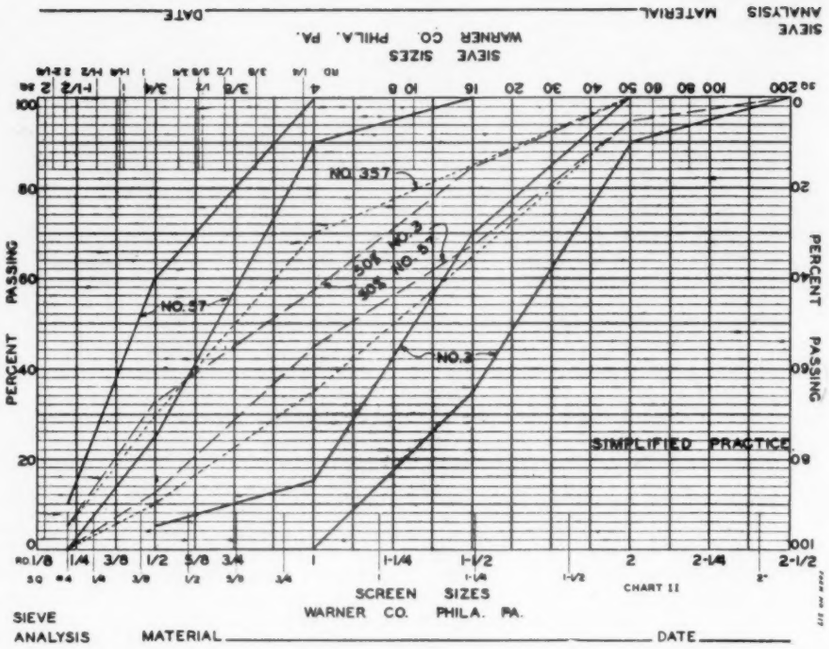



Chart II

limit should be raised from 2⅛-inches round to 2½-inches round. A mathematical study indicates that the graph showing 28 per cent. at 1¼-inches would come down to 21 per cent., and the 12 per cent. intersection point will reduce to .12-inch from the previously noted 0.14-inch. This increases the tolerance from the above noted .03-inch to .05-inch, but this is still quite insufficient for all the vicissitudes of production.

It is therefore evident that the producer can make any two of these paired sizes only by removing a "middling".

At the plant just discussed it will be necessary to use two screens ⅛-inch apart with the middlings returning to the crusher. Less efficient screening may require a differential as great as ¼-inch. There may be some plant that is greatly over-screened that can produce these paired materials with a single separation, but it will be a rarity.

If any producer is making a full sequence of Simplified Practice sizes, as for example, Numbers 3, 4, 57, 67, etc., then the Number 4 can be used as a middling for Numbers 3 and 57. The

*(Continued on page 54)*

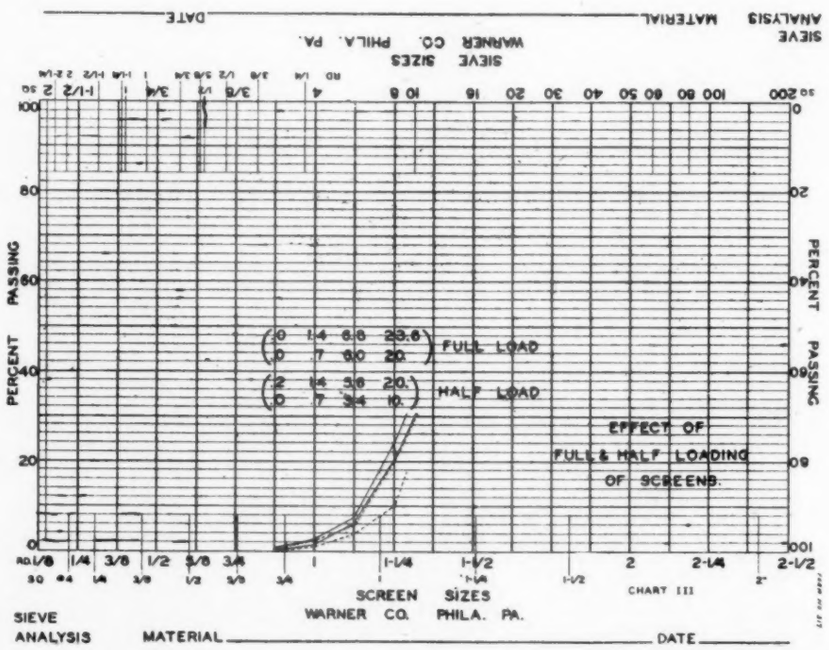



Chart III

**Convention** *(from page 40)*

23 cents a ton. In contrast to this only 12 per cent. of the 108,000,000 tons reported produced by commercial operations was unprepared. Contractors produced nearly 60 per cent. of the material reported by state highway departments in 1938. A little less than a third of the total tonnage was reported by counties and 20 per cent. of that was produced by contractors. Municipalities reported only 3 per cent. of the total, the remaining 15 per cent. having been accounted for largely by federal government agencies.

Director of Engineering Stanton Walker then gave those in attendance an idea of some of the problems which are presented to him and his staff in the engineering division of the association.

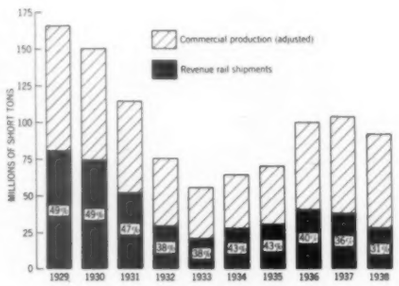
The coöperative work undertaken two years ago with the University of Maryland has progressed materially, according to Mr. Walker. A full-time assistant has been engaged for the engineering division and there has been an increase in the use of part-time student assistance. Since this work was commenced new equipment has been installed: a Los Angeles rattler for abrasion tests, a compressor and cooling coils for maintaining uniform temperatures for moist-curing concrete and making soundness tests of aggregates, metal racks and new equipment for the moist-curing of concrete specimens, additional facilities for making soundness tests by the salt methods, a sieve shaker for making sieve analyses of coarse aggregates, devices for surface-drying sands, and other appliances.

Mr. Walker referred to the work being done on the problems involved in trying to make bitumens adhere to aggregates, in the determination of the physical characteristics of aggregates, in abrasion tests and soundness studies, in the study of the action of sands in mortar, in the determination of the modulus of elasticity, and the like. He also mentioned the association's publishing activities and its coöperation with technical societies.

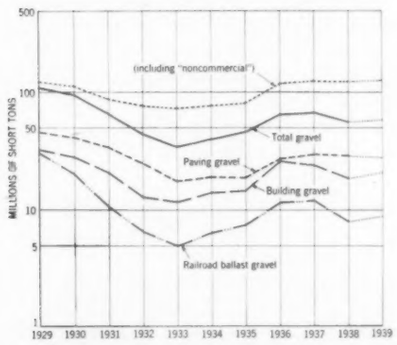
The session closed with a paper on the "Use of Gravel in Concrete and Bituminous Mixtures," by W. H. Wood, engineer of materials and tests, Texas State Highway Department, and a discussion of "Promoting Use by Service Records," by Ray V. Warren, engineering representative, Western Pennsylvania Sand and Gravel Association.

The Friday afternoon meeting was a joint session of the sand and gravel and the ready-mixed-concrete associations, presided over by their newly-elected presidents. Labor relations in the two industries was the subject of the discussions. Experiences with collective bargaining, the extent of unionization in the industries and the division between A. F. L. and C. I. O. unions, the extent of customer unionization, typical contract provisions dealing with working conditions, work limitations, compensation for overtime, dismissal wages, bonus systems, vacations with pay, welfare plans for employees, housing and food subsidies, group-insurance plans, rates of pay for common labor and semi-skilled and skilled labor, pre-employment and periodic physical examinations of employees, guaranteed employment, and similar topics engaged the attention of those present. By agreement producers described their problems and conditions frankly on the understanding that their remarks would not be quoted in the trade press.

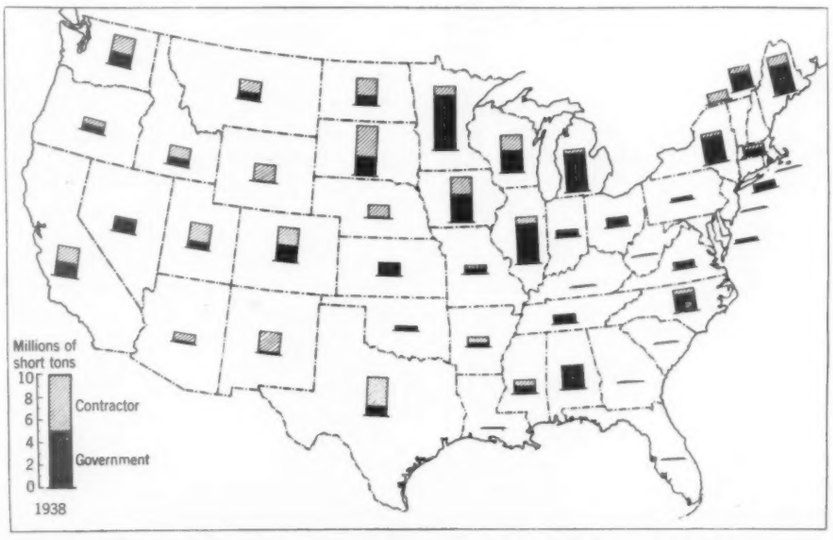
Commercial and non-commercial (government-and-contractor) production of sand and gravel, 1938.




Percentage of sand-and-gravel output shipped by railways, 1929-38.




Breakdown of gravel output, 1929-39.




Breakdown of non-commercial production of sand and gravel, 1938.

**Warner** (from page 52)

Number 5 fraction of Number 57 can be used as a middling for Numbers 4 and 67. But there will be very few producers who will make the full sequence.

Those who do make everything and use the alternate sizes as middlings to be removed will find that they have a very costly operation whenever the sales of the different pairs are not in balance. From the users' standpoint this is very bad, since the products will vary greatly, although within the specification.

In the design of concrete it is essential that the aggregates be reasonably consistent in their grading. Consistency is of greater importance than adherence to an unnecessarily harsh specification.

This brings us to the question as to the value of these specifications to the buyer. Chart II shows graphs for Numbers 3 and 57; also a total graph if these aggregates are combined in the field on a 50-50 basis. Also is shown Number 357 which is one of the fully graded specifications of the Simplified Practice.

The graph of Number 3 plus Number 57 exhibits an astonishing narrowness at the middle. In practice this will be more pronounced, for the producer should have his margin of safety of five points with *each* material. No concrete engineer needs or expects such a narrow tolerance at the middle point of his coarse aggregate. It is usually considered that reasonable tolerance is permissible in the middle, but that more precise limits should be used at the ends. The graph of Number 3 plus Number 57 exhibits the reverse characteristic.

That greater tolerance is permissible in the middle is made evident by the graph of the fully graded aggregate Number 357. It is excessively wide where Number 3 plus Number 57 is narrow. Both specifications were prepared by the same Simplied Practice Committee, yet both can not be right.

It is the opinion of this writer that Number 357 is entirely too broad for good practice and Number 3 plus Number 57 is unnecessarily narrow so that it works a hardship on the producer and will cause the user trouble from a grading that is erratic even when within the specifications. For it is a well-known fact in aggregate production, that producing in a natural and regular manner results in a uniform grading, but the use of trick methods to give special grading always gives erratic results within the specification.

An illustration of the erratic action of screens when not operating normally is shown in Chart III. In this case, three special tests were made, each test consisting of sampling and testing the over-product when the plant was running fully loaded and normally, followed immediately by sampling when operating at half capacity, thus eliminating so far as possible any other variables.

The two full lines show the limits of the three tests when the plant was fully loaded. The two dotted lines show the limits when half loaded. Although one of the half-loaded tests showed as low as 10 per cent. passing the same 1¼-inch screen as used in the plant, the maximum result was 20 per cent. This wide variation in results is a characteristic of a fractionally-loaded plant with which operators are well familiar. On the other hand, whereas the normally loaded results are higher (20 to 23.6 per cent. passing 1¼ inches) the maximum and minimum lines are close together. This consistency of results is also to be noted on Chart I. The maximum and minimum lines of both products lie close together. In the case of the under-material, twelve tests were made and with the over-material, six tests were made, both under widely varying plant conditions and on different days.

It is respectfully suggested to the Simplified Practice Committee that it make Number 357 somewhat less tolerant at the middle point of 1-inch and then so specify Number 3 and Number 57 that, when used in the desired proportions such as 50 per cent. of each, the resulting combination will have substantially the same gradation tolerances as the Revised Number 357.

The same consideration should likewise be given to the other pair of combinations so that any principle adopted is carried throughout the sequence of sizes.

There is already a precedent for this in the Simplified Practice itself, Number 5 and Number 7 go together to form a Number 57. At the dividing point of ½-inch, Number 5 shows 15/35 per cent. and Number 7 shows 90/100. However it is not believed to be necessary nor wise to go as high as 35 per cent. passing the under screen. A figure of 30 per cent. would be ample, but the 90/100 per cent. passing for the under-material is too close. This should be changed to 80/100 per cent. With a 50-50 per cent. mix, the combination would show 40 per cent. to 65 per cent. passing 1-inch, a tolerance which is much closer than the 35/70 specified for Number 357, a tolerance which in practice is further reduced because of the producer's double margin of safety on two products.

Thus, in combining any pair, the resulting mixed product will show a very close tolerance, actually approximating the 45/57½ per cent. now shown on Chart II of the 50-50 mix of Number 3 plus Number 57. Even better for the user, the product of any one plant will show a high degree of consistency so long as the plant is operated naturally and normally. But if the operator is compelled to resort to trick methods in order to meet an unnecessarily harsh specification, the product will surely exhibit considerable variation within the limits of the specification.

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## Better Business' Effect on Wages and Hours Law

Improvement in business, the American Management Association points out, has made it necessary for companies either to put employees on longer hours or to hire additional workers. If the former is done, the concerns must pay time-and-one-half overtime under the Fair Labor Standards Act (wages-and-hours law); if additional temporary men are employed, they will have to be released when demand falls off, which means that the companies will be penalized with a higher unemployment insurance tax beginning in 1941, 1942 or 1943, depending on the state in which they operate. Unemployment insurance merit rating, under which a concern's unemployment-tax contribution is based on its rate of personnel turnover, is a feature of the unemployment insurance law in 40 states and territories.

"Either course of action involves additional expense," the association states. "But if the heavier volume of production extends over a comparatively short time, many manufacturers believe that it will prove to be more economical to work longer hours and to accept the overtime penalties under the wages-and-hours law."

The subject is one that was discussed at the conference of the association's Financial Management Division, which was held at the Hotel New Yorker, New York, on January 24 and 25.

"The record of experience on which unemployment-insurance taxes will be based is now being made," the announcement continues. "If the turnover of employees is high—if large numbers of workers are hired for a short period and then laid off—the result will be a higher cost of insurance in future years when merit rating becomes effective.

"Since the spread between the rates of different companies in some states may go as high as 4 per cent. of the annual pay-roll, the incentive for stabilizing employment and building up a favorable experience is becoming very real. Competing manufacturers will find this sizable difference in their tax rates an important advantage or a handicap, whichever the case may be."

# Why Some Local Trade Associations Succeeded Where Others Failed

By E. T. NETTLETON

**Secretary and Engineering Director, New York State Crushed Stone Association**

THE apparent desire or need for local aggregates associations appeared back in the prosperous nineteen-twenties, as shown by the formation at that time of a few local stone or aggregate associations. Although the National Crushed Stone Association had been in existence since 1918 and was doing excellent work, it was evident that it would be impossible for it to look after local legislation, laws, industrial codes, specifications, highway programs, municipal, county, and state competition, coöperate with allied local industries and act as spokesman for the local industry.

As a general rule, however, the early local association meetings were spasmodic and usually called to protest some particular law or ruling. Often the meetings tended more towards the social side rather than the technical or business viewpoint. Work was carried on through voluntary efforts, no paid executives being employed. Dues or assessments were very modest and usually on a flat-rate basis.

With the coming of the N. R. A. local associations sprang up like mushrooms. The ideas of stabilizing prices and, possibly, limitating further capital investment in an industry already overexpanded appealed to all. The possibility of making and collecting assessments from all producers made financial budgets for associations easily obtainable. The ease of obtaining finances in some cases tended to over-salary and overexpand association activities. With the collapse of the N.R.A. many associations fell by the wayside.

Out of the wreckage, however, survived several of those associations existing before the advent of the N.R.A. plus some associations which had been formed under the code and whose members were big enough and whose outlook was not too divergent to appreciate the need and possibility of continuing activities along those lines which legally might be possible.

With this brief history in mind it was quite evident to the writer that a study of the need for local aggregates associations as well as the reasons for success of some and failure of others would be interesting and enlightening.

*The Need for Local Associations.*—In discussing the need for local association the question arises, "What does business or industry face to-day?" Business and social conditions are becoming more complex each year with corresponding restrictive legislation, laws, rulings, industrial codes, and changing labor conditions. Standards and technical requirements are becoming more stringent as the result of tests and research. Last, but not least, government's competition with private industry is becoming a menacing factor. With these facts in mind it is not strange that leaders of business enterprises who formerly were big enough to protect their own individual business in normal competition now agree that the success of their particular business and the furnishing of steady employment for their workers is more dependent on the success of the industry than on the failures of their competitors.

In order to obtain the economic advantages of large-scale industry for the benefit of the consumer, to improve the working conditions of employees, to insure steady employment and at the same time protect the financial obligations of the employer to the investing public, business to-day is faced with one of four alternatives.

The first is the formation, by the combination of present existing independent businesses, of one large corporation with the loss of independence of the individual company, its subjection to dictatorship and possible monopolistic control.

The second alternative is government participation. Carried to its ultimate, a socialistic society or state would result.

The third alternative is government regulation. Experience of the recent N. R. A., with inefficiently enforced administrative decrees by inexperienced absentee officials and the illegality of the act, speaks for itself.

The fourth alternative is the establishment of trade associations. This method provides the last stronghold of independent business units and is necessary to the maintenance of the essentials of free competition and the encouragement of independent business units.

*Reasons for Success and Failure.*—In order to complete this study 17 local crushed-stone associations, or aggregate associations including crushed stone, were sent a questionnaire. Replies were received in 16 cases and it appears reasonable to assume that the seventeenth organization has ceased to exist. The information received showed that 4 of the associations are out of existence, leaving a remainder of 12, of which 6 employ a paid executive and 6 do not.

Thus the study resolved itself into three parts: (a) associations employing paid executives, (b) associations functioning without paid executives, (c) failures.

The salient facts regarding the 6 associations employing paid executives are given in Table I.

Three of the associations included gravel, slag or sand producers, whereas an equal number limited membership to crushed stone only, although either slag, gravel, or both were competitive in their territories.

Dues in all six cases were assessed on a yearly tonnage basis. In some cases, however, it was reported that in no one year should any one company pay over a certain maximum limit or lump sum, even though, on a tonnage basis, the calculated assessment might exceed this limit. The amounts of money actually being paid by any single company as reported varied from $25 to $2,000 per year. Two of the associations reported having associate members consisting of equipment, explosive and allied interests, whose annual dues were $10 in one case and $50 in the other.

The yearly budgets of the associations ran from a minimum of $4,800 to a maximum of $12,000, with an average of $8,883. Total company active memberships varied considerably due to the area involved, size of individual units of production, and ownership or lack of ownership of many units by a single producer. Such memberships ranged from 8 to 135 per association with 51 companies as an average.

It was very evident that this group carried on by far the most comprehensive and successful programs for the benefit of the members and the industry at large.

A glance at Table II, which deals with the 6 associations without paid executives, gives these statistics:

Two of these associations are extremely limited in their work and it is questionable whether they should be reported or included as associations. Of

the four remaining associations, two include gravel or slag as well as stone, whereas the other two were limited to crushed stone only, although gravel competition exists in both their territories.

Dues in general were on a flat-rate basis, either set at a nominal figure or fixed by assessment from time to time. The total annual budget varied from nothing to $400.

The work being carried on was extremely limited and in many cases with not much success or satisfaction being reported.

*Reasons for Failure.*—Of the four associations which failed, three went out of existence with the N.R.A. The direct reasons naturally were financial. Back of this lack of financial support were many reasons, such as the collapse of the price structure which had been falsely and temporarily supported by the N.R.A. code. This was followed by hard feeling and lack of confidence in competitors, associations, or paid executives. Some producers expecting the association to fix prices dropped out when such did not take place. Other producers, believing that they had paid plenty under the code, were now expecting a free ride at the expense of their competitors.

The fourth association, although existing after the N.R.A. and employing a paid executive, subsequently failed. In this case many of the member companies wished to employ their own engineers to give special attention to projects within their own immediate territories and to advance the merits and peculiar properties of their own aggregates compared with those of their competitors. Consequently they were not willing to continue financially to support the association.

*Conclusions.*—From the above study it is quite evident that those associations which have been successful have had clear-cut aims and activities in harmony with existing laws and statutes. They have had proper organization; capable, full-time, paid independent executives; adequate finances and the coöperation of their active members. Those failing have lacked one or more of the above characteristics or were built under the N.R.A. with the government as a leaning post.

It is quite clear that the complexity and wide range of problems arising in each organization require the full attention and time of one or more persons. With adequate salary the paid executive is independent of other means of making a living and, therefore, is in a position to be impartial and fair. As a consequence he is recognized and respected both within and without the industry as its representative. Besides, the employment of a paid executive gives a continuity to the association and its activities not attainable through ever-changing officials elected from active members of the association.

Furthermore, it is apparent that the producers in the successful organizations are big enough to understand the limitations on what may be expected of their associations, as well as to appreciate the advantages. Moreover, they are acquainted with the following facts:

1. *Advantages to a large producer.*—It is often said that a large producer can himself carry on the work done by an association. If he could set up a similar personnel and adopt similar aims and activities, he might be able to do so after a fashion. However, the public would view such action as motivated by self-interest and as evidence of a desire to dominate. Public officials would rightly fail to accept such a concern or persons as spokesman for the industry. Furthermore, the total cost of carrying on this work would be many times the cost of association membership.

2. *Advantages to a smaller producer.*—Small producers often feel that, being so limited in their operations, they can easily "contact" their local authorities. Regardless of this fact, local towns or municipalities look to the state and federal governments for a large part of their finances and adopt state and federal specification requirements. Furthermore, state and federal laws apply to the safety features of their plants and the working conditions and hours of their laborers. For a small producer to carry on the work done by an association would be financially impossible.

Small producers often feel that they do not benefit financially as much by associations as larger producers. In total benefits they probably do not, but, based on the relative size of their membership dues, they actually benefit more. Small producers receive in proportion much more technical and operating advice than do larger producers, who usually have full-time general superintendents, safety engineers and research experts.

3. *Advantages to the by-product producer.* — Where aggregates — crushed-stone, for example—are a by-product,

**Table I—ASSOCIATIONS EMPLOYING PAID EXECUTIVES**

| | Association | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| Year formed | 1938* | 1936* | 1935 | 1935 | 1934 | 1933 |
| Active members (companies) | 22 | 135 | 8 | 58 | 55 | 28 |
| Membership: Stone producers only | yes | yes | yes | no | no | no |
| Includes sand, gravel or slag producers | no | no | no | yes | yes | yes |
| Associates (non-producers) | yes | yes | no | | | |
| Yearly Budget | $10,000 | $12,500 | $8,000 | $4,800 | $6,000 | $12,000 |
| Services: | | | | | | |
| Public Relations | yes | yes | yes | yes | yes | yes |
| Industrial Relations | yes | yes | yes | yes | yes | yes |
| Labor Relations | yes | yes | | | | yes |
| Legal Service | yes | yes | | | | yes |
| Diplomatic Relations | yes | yes | yes | | | |
| Financial | yes | yes | | | | |
| Purchasing | yes | | | | | |
| Production | yes | yes | | | | |
| Promotional | yes | yes | | | | |
| Marketing Problems | yes | yes | yes | yes | yes | |
| Miscellaneous | yes | yes | | yes | | |

* Year association expanded and started to employ paid executive. Former association in existence in the nineteen-twenties.

**Table II—ASSOCIATIONS NOT EMPLOYING PAID EXECUTIVES**

| | Association | | | | | |
|---|---|---|---|---|---|---|
| | G | H | I | J | K | L |
| Year Formed | 1932 | 1937 | several years | 1935 | (1) | (2) |
| Active members (companies) | 35 | 14 | 30 | 11 | x | y |
| Membership: Stone producers only | yes | yes | no | no | no | no |
| Includes sand, gravel or slag producers | no | no | yes | yes | yes | yes |
| Yearly Budget | $400 | $70 | $150 | assessments as needed | none | |
| Services: | | | | | | |
| Public Relations | yes | yes | yes | yes | | |
| Industrial Relations | | | | yes | | |
| Labor Relations | | | | yes | | |
| Legal Service | | | | | | |
| Diplomatic Relations | | yes | | | | |
| Financial | | | | insurance rates only | | |
| Purchasing | | | | | | |
| Production | | | | | | |
| Promotional | yes freight rates only | | freight rates only | | freight rates only | |
| Marketing Problems | | | | | | |
| Miscellaneous | | | | | | Reporting service; tabulation of bids only |

[1] Exists in name only. Volunteer efforts from time to time.
[2] No longer functions as a formal organization; reports bids only.

executives have less time and thought for the subject. Consequently, association membership offers to them the least financial expenditure, a solution for problems concerning which they are least informed.

4. *Willingness to understand competitors in the association.*—There always has been, and probably always will be, a small percentage of people, non-coöperative by habit, suspicious by nature, lacking in foresight, who are not big enough to "bury the hatchet," and who have become antagonistic towards their competitors, usually through the efforts or falsehoods of unscrupulous buyers. They are the hardest to interest in membership. Once they have really become imbued with the spirit of fellowship, understanding, and trust, they are the stanchest advocates for association activities.

5. *Confidence in the association.*—There have been failures in trade associations in every line of business; however, to condemn any particular association or business on generalities is to condemn all private business and initiative.

6. *Confidence in the full-time paid director, manager, or secretary.*—Some associations have failed due to wrong personnel, just as other businesses have done. A full-time paid executive for an aggregates association should have the following qualifications: experience in the aggregates industry; experience in state or government highway construction, testing, and research; mature judgment; impartiality; friendliness; and the respect of engineers, public officials, and the public, as well as of the members at large.

7. *Do not expect to reap rewards without paying.*—Naturally many activities of an association are of direct as well as indirect benefit to all in the industry regardless of whether they are members or not. To those who wish to have music without paying the fiddler no amount of logic will suffice. For the information of the supporting members it might be stated that there are many direct services rendered by the association headquarters to them which are not rendered to nor received by those outside the association. Perhaps a Rotarian might express it, "He profits most who serves the best."

8. *Do not expect an association to fix prices.*—Just because agreement on price levels is not a function of the association, there should be no reason why competitors can not act together on their many other problems, such as public, industrial, labor, and diplomatic relations, scientific information, promotion, marketing, and legal matters.

Weighing and considering these facts thoughtfully, it is quite possible that the reader may come to the opinion held by the really *big* men in both large and small companies. Men who formerly never gave attention to their trade associations have come to realize that what a trade association does or fails to do may mean life or death to both the industry of which they form a part as well as to their particular enterprises.

## Meshberger

(from page 50)

loaded into trucks by a Barber-Greene bucket-loader.

The bins have a total capacity of 400 tons and, operating at "peak" performance two shifts, the plant has turned out as much as 1,000 tons in a day. All shipments go by motor-truck and are

Portable loader at stock-pile.

weighed on a Winslow truck-scale. Homer D. Cole is superintendent of the Columbus plant. The Meshberger Brothers also operated crushing-and-screening plants at three other Indiana locations—Decatur, Linn Grove, and Pleasant Mills. Harry Meshberger is president and Oscar Meshberger is secretary-treasurer and general manager.

## Road Show

(from page 25)

What type of roads does the War Department recommend? What routes do they want? These are vital questions General Stanley H. Ford answered at the 1940 A.R.B.A. Road Show-Convention in his address, *The Military Requirements for Our Highway System.*" For the most part recommendations for military routes will closely coincide with routes proposed by the Public Roads Administration. Of particular interest to army officials is the contemplated construction of an interregional system of highways. The most serious obstacle to free military movement is the congestion common to metropolitan areas. Industrial and military mobilization would create a traffic burden of unbearable proportions in and between our larger cities if the present system of inadequate highways is not improved.

H. V. Kaltenborn, renowned Columbia news commentator and war correspondent, was present at the convention to provide delegates with the latest inside information about current activities in the European strife. The theme note of his talk concerned the provision of roads for preparedness and the eventuality of an attempted invasion of the United States.

Most of the foreign road builders who visited the Road Show-Convention represented South American countries. The "good-neighbor" nations are also involved in a highway-building snarl of growing complexities. The nations of South America have rich but undeveloped hinterlands. The precluding difficulty in the utilization of this untapped natural wealth is getting to it. The answer, of course, is roads. Then, too, South American cities are suffering the same congestion ailment that is throttling automotive transport in the United States. Before the outbreak of war, Great Britain and Germany were the United States' outstanding competitors in the export of road-building equipment. United States manufacturers stand alone to-day as providers of equipment to South American road builders. An invaluable contribution to the cultural and commercial relations between North and South America will be the completion of the Pan-American Highway. Several officials of Latin America reported on the progress of this international road at the A.R.B.A. Pan-American session. E. W. James, transport division chief, Public Roads Administration, talked on *The Inter-American Highway.*

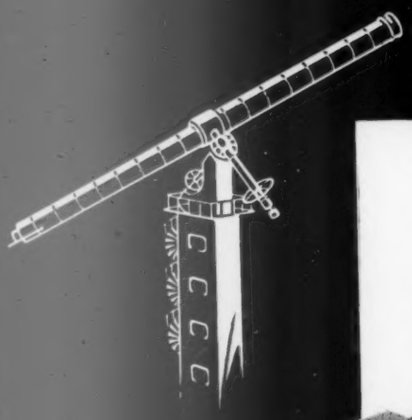
The principle that, since the roads belong to the state and the state belongs to the people, the roads must belong to the people, has concentrated increasing attention on the modern problems of public relations. A significant event of the 1940 convention was the inauguration of the Public Relations Division of the American Road Builders' Association. Such an organization is expected to be a great instrument for the sale of good roads to the public that has ever been created.

## Wisconsin Silica Plant to Resume Operations

Palmer Brothers, operaters of gravel pits at Verona and Hartland, Wisconsin, have purchased the property of the former White Rock Silica Company near Browntown, Wisconsin, formerly owned by the defunct B. E. Buckman & Company, Madison. The property was bought at bankruptcy sale for $13,000. At the time of its construction, it was estimated that the plant cost $300,000.

"FIRST MAGNITUDE"
IN *Fine Mesh* SCREENING

You don't need this TELESCOPE



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The Leahy HEAVY DUTY

VIBRATING SCREEN with TRI-VIBE has SUPER-STAR Features

Write for BULLETIN No. 14-H

Tri-Vibe triple powers the free swinging screen jacket . . . gives better distribution of vibratory action and prevents blinding.

Now going into its second year, the Tri-Vibe feature of the LEAHY Type C Vibrating Screen is a development of the first magnitude in screening equipment, as proved by performance tests on many difficult grading jobs.

With specifications tightening up and production costs on the increase, you cannot afford to operate with inadequate or obsolete equipment. Why not profit by the experience of other producers and take advantage of the extra capacity, continuous uniformity and demonstrated economy of the LEAHY Type C No-Blind Vibrating Screen!

Its efficiency rating ranges between 90% and 97% in sustained operations. Only ½ HP is required to run it under maximum load. Maintenance costs are less than 1% of the original investment annually. You cannot match this with any other screen at any price.

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*The Original Deister Concentrator Company*

Est. 1906

911 Glasgow Ave. Fort Wayne, Ind.

Spray Nozzles • Duplex Washing Tables • Leahy Screens • Constriction Plate Classifiers

# Personal Mention

LEONARD M. SMITH and GEORGE D. FOOTE have taken over the Diamond Iron Company's plant and pit at Corinth, New York, and are doing business under the name of the Saratoga Sand & Gravel Company.

W. W. DEADMAN, for many years superintendent of the Bonner Springs, Kansas, plant of the Lone Star Cement Corporation, has been transferred to the corporation's plant at South Norfolk, Virginia, where he will serve in a similar capacity.

A. J. BOASE, manager of the structural bureau, Portland Cement Association, addressed the Louisiana Engineering Society at New Orleans January 12 on the subject, "Concrete—New Applications in Piling and Architectural Design."

CHARLES G. WILLIAMS, formerly vice-president of the American Chain and Cable Company, has been appointed general manager of the John A. Roebling's Sons Company, Trenton, New Jersey.

HENRY S. GRAY, secretary and treasurer of the Louisville Cement Company, died suddenly on Christmas day following a heart attack at his home in Louisville. He was 73 years old and had been connected with the company for more than a half century, having started work shortly after arriving in this country from his native England.

HOWARD PLATT TREADWAY, 65, president of the Kansas City Crushed Stone Company, died in Kansas City recently. Until his retirement a year ago, he served as president and treasurer of the Kansas City Bridge Company.

CHARLES J. LARKIN, 87, president and founder of the Rock Island Sand & Gravel Company, Rock Island, Illinois, died January 1, 1940. He is survived by the widow, four daughters and four sons, one of whom, Harry J. Larkin, is general manager of the sand-and-gravel concern.

# Occupational Diseases and the Law

## Reconsideration

*State ex rel. The Timken Roller Bearing Co. v. Industrial Commission of Ohio et al.*, decided by the Supreme Court of Ohio, December 13, 1939; reported at 16 O. O. 81, 136 Ohio St. 148. On July 20, 1928, the employee involved in this case filed an application with the Industrial Commission of Ohio for disability benefits under the Workmen's Compensation Law, stating that he had contracted the occupational disease of lead poisoning and that his disability therefrom began on or about April 1, 1928. The commission denied compensation on the ground that the proof failed to show that he was suffering any disability from a compensable occupational disease. Various subse-

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GET THROUGH WHERE OTHER TRUCKS FALTER AND FAIL

Look at the mud! Could *your* trucks get through? Marmon-Herrington *All-Wheel-Drive* Fords *can*, and are doing it every day in the week. They perform just as amazingly in deep sand or snow, and climb surprisingly steep hills and grades with the greatest of ease. Safest vehicles built for slippery highways.

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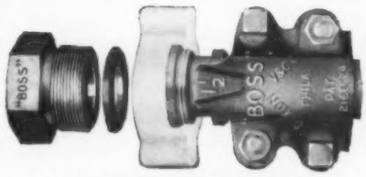
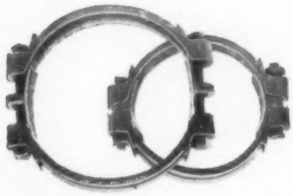
Two Ways to Make Hose Give Better Service... *Longer!*




"BOSS"
HOSE COUPLINGS

WASHER TYPE (Illustrated) STYLE W-16
GROUND JOINT TYPE, STYLE X-34
COMPANION MALE COUPLING, STYLE MX-16

"BOSS" Couplings not only provide insurance against leaks, pressure losses and shutdowns, but also make the hose upon which they are used last longer by actually protecting it at the most common point of failure—the ends. All parts are steel or malleable iron, cadmium plated to prevent rust. Sizes: 1/4" to 4", inclusive, with sturdy "BOSS" 4 Bolt Offset Clamp on 1" and larger. Two Bolt Clamp on 3/4" and smaller.



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The "KING" Two Bolt is a super-strength clamp with exclusive quadruple take-up feature. Half sections of clamp are shaped to embed in hose, forcing the hose into grooves of nipple or corrugations on shank of coupling. Scientifically designed to provide maximum clamping efficiency without cutting or otherwise harming the hose. No possibility of seepage or leakage. Will normally outlast any hose and can therefore be used repeatedly. Cadmium plated—rustproof. Sizes: For hose with 3 1/2" to 17 1/4" O. D.

*Ideal for Dredge Sleeves up to 17 1/4" O.D. For larger Dredge Sleeves, "KING" Double Bolt Dredge Sleeve Clamps are recommended.*

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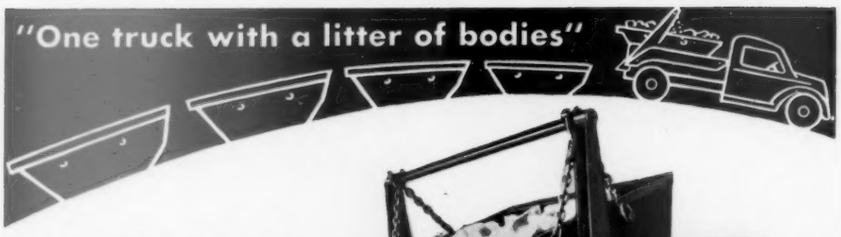

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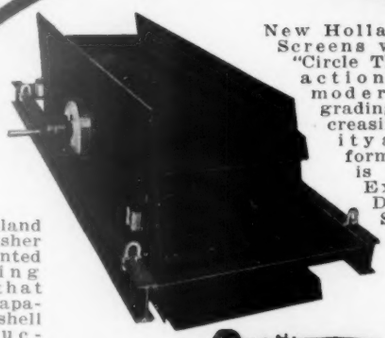
NEW HOLLAND



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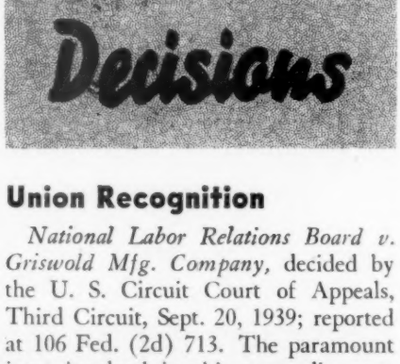
quent proceedings attempting to change this result were decided against the claimant until July 27, 1939, when the commission (with different personnel) reviewed all of the evidence previously submitted and awarded compensation to the claimant. In this action the employer challenged the jurisdiction of the commission, since the application for reconsideration (May 4, 1939) was beyond the ten-year limitation specified in Section 1465-86 of the Ohio General Code.

The first provision for compensation for occupational diseases in Ohio was made by enactment, in 1921, of Section 1465-68a. At the same time the Legislature enacted Section 1465-68b, making the provisions of the Workmen's Compensation Law (Sections 1465-44 to 1465-108) applicable to occupational diseases. The ten-year limitation clause was not contained in Section 1465-86 in 1921, but was enacted by amendment of that section in 1931. In this action, the claimant maintained that the Workmen's Compensation Law applicable in occupational disease cases is the law as it existed in 1921 when Section 1465-68b was enacted, without regard to subsequent amendments. The Supreme Court, however, rejects this contention, holding that such a construction would entail a confusion which the Legislature did not intend, and that amendments to the Workmen's Compensation Law apply equally to occupational disease cases.

The court accordingly rules that the industrial commission was without jurisdiction to consider the application for reconsideration filed more than ten years after the claimed date of the disability. Since the employer has no right of appeal from the compensation order, a writ of prohibition against the commission is allowed.




## Union Recognition

*National Labor Relations Board v. Griswold Mfg. Company,* decided by the U. S. Circuit Court of Appeals, Third Circuit, Sept. 20, 1939; reported at 106 Fed. (2d) 713. The paramount issue involved in this proceeding, according to the opinion filed, was whether

recognition of the union is "the essential basis of the collective bargaining guaranteed by the National Labor Relations Act". The employer-respondent refused to recognize the union, comprised (according to the court) of a majority of its employees, for the purpose of collective bargaining. It chose to "recognize", instead, a committee designated by the union as a "plant committee", and contended that it had done all that it was required to do under the terms of the Wagner Act, that is, to "meet and confer with the authorized representatives of its employees".

The court "can not subscribe to that contention", holding, indeed, that "the very soul of the Wagner act is its mandate that the employer shall, if the employees so desire, bargain with the union of the employees as a unit, and the recognition of that unit in the bargaining process. We feel most strongly that to adopt the respondent's contention would be to destroy the Wagner act." Further: "Collective bargaining is one of the principal intendments of the National Labor Relations Act. Equal in importance is the intendment of this act that employees shall be given the right to organize. Accomplishment of the intendments (1) to organize and (2) to bargain collectively, become a mockery if recognition of the bargaining agency is withheld." "The prohibition against the so-called company union and its domination by the employer is designed to prevent the rights of employees from being nullified by an organization which is responsive to the will and the purpose of the employer."

The order of the board, forbidding interference with the organizing of the employees and support of an employees' union, and requiring the company to bargain collectively (upon request) with the union found to be the representative of the employees, is to be enforced under the decree of the court.

## Company Control

*National Labor Relations Board v. Newport News Shipbuilding & Dry Dock Company,* decided by the U. S. Supreme Court, December 4, 1939; reported at 60 S. Ct. 203. The respondent company in 1927 put into effect, in cooperation with its employees, a plan of employee representation. The plan was variously revised in subsequent years, the last time in 1937, to bring the plan within the letter as well as within the spirit of the National Labor Relations Act. As revised, the plan provided that action of the Employees' Representative Committee should "be final and become effective upon agreement by the company" and that amendments to the plan should become effective at specified times "unless disapproved by the company within fifteen days after their passage." The National Labor Relations Board found that the plan constituted domination and interference by the employer, and ordered the company to withdraw recognition of the committee and to disestablish it as the bargaining representative of the committee. The Circuit Court of Appeals struck those provisions from the board's order, but the Supreme Court, in this action, concludes that the board's order was correct and remands the case for appropriate proceedings.

It was uncontradicted that labor disputes have repeatedly been settled under the plan; that since 1927 no labor dispute has caused cessation of activities at the plant; that overwhelming majorities of employees have participated in the election of representatives; that the company has never objected to its employees joining labor unions; that no discrimination has been practiced against them because of membership in outside unions; and that neither officials nor superior employees, not eligible to vote in the election of employees' representatives, have interfered, or attempted to interfere, or use any influence, in connection with the election of representatives.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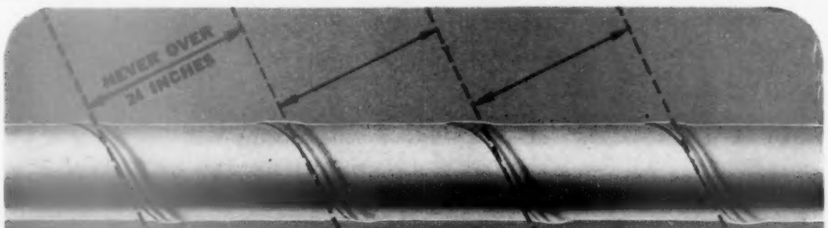


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Nevertheless, the Supreme Court "can not say that, upon the uncontradicted facts, the board erred in its conclusion that the purpose of the law could not be attained without complete disestablishment of the existing organization which had been dominated and controlled to a greater or less extent by the respondent. In applying the statutory test of independence it is immaterial that the plan had in fact not engendered, or indeed had obviated, serious labor disputes in the past, or that any company interference in the administration of the plan had been incidental rather than fundamental and with good motives. It was for Congress to determine whether, as a matter of policy, such a plan should be permitted to continue in force." The court thinks that "the statute plainly evinces a contrary purpose, and that the board's conclusions are in accord with that purpose."

## Evidence

*National Labor Relations Board v. Empire Furniture Corp.,* decided by the U. S. Circuit Court of Appeals, Sixth Circuit, November 8, 1939; reported at 107 Fed. (2d) 92. In this action the Board sought enforcement of its order directing the respondent company to reinstate three employees, and to pay wages to a fourth who did not desire re-employment, on the ground that such employees had been discharged for union activities. Upon a review and discussion of the record, the Court decides that the board's findings were unsupported by substantial evidence, and that the reasons for the discharge of the employees were not their union activities; the board's petition for enforcement is, accordingly, denied.

## Union Membership

*Montgomery Ward & Co. v. National Labor Relations Board,* decided by the U. S. Circuit Court of Appeals, Seventh Circuit, November 7, 1939, rehearing denied December 8, 1939; reported at 107 Fed. (2d) 555. The point at issue in this case was the validity of parts of an order of the National Labor Relations board, appealed from, ordering reinstatement of certain employees who, according to the board's findings, were discriminatorily discharged to discourage union membership. In certain departments known to be strongly unionized, where the discharged employees were almost all union men, the court holds the finding justified by the evidence and decrees enforcement of those parts of the order. In another department, however, the evidence fails to show discrimination, and that part of the order is reversed.

## Discharge

*National Labor Relations Board v. Boss Mfg. Co.*, decided by the U. S. Circuit Court of Appeals, Seventh Circuit, November 7, 1939, rehearing denied December 7, 1939; reported at 107 Fed. (2d) 574. This was an appeal from an order of the National Labor Relations Board in which, among other things, the respondent company was directed to reinstate certain employees which the Board found to have been discharged because of union membership. A review of the evidence does not convince the Court that the ground for discharge was union membership, rather than discontinuance of certain jobs, as the company contended, and enforcement of that part of the order is refused. The Court points out that "the Act does not interfere with the normal right of the employer to select his employees or to discharge them" and that "evidence that particular jobs had been discontinued and that no replacement employees have been hired tends to show that the discharges are not discriminatory and may constitute a defense."

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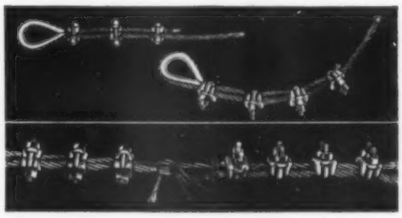

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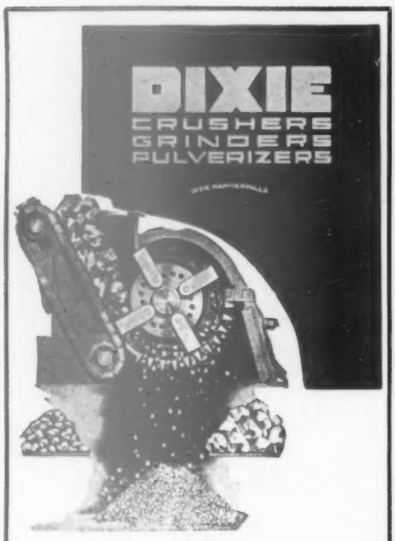


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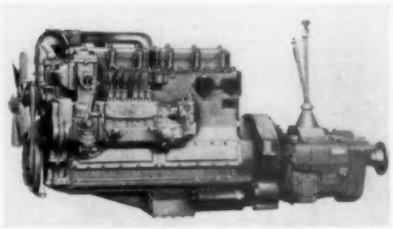
# New Machinery and Supplies

## • Truck Engine

The Caterpillar Tractor Company has announced its entry into the automotive field with a 90-horsepower Diesel truck engine. The engine is a six-cylinder, four-stroke valve-in-head, water-cooled model with a bore of 4¼ inches and a 5½-inch stroke. The engine fuel system features solid injection into precombustion chambers. Pistons are of aluminum alloy.



Diesel truck engine.

## • Crawler Tractor

A new line of high-speed Diesel crawler tractors powered by General Motors Diesel engines has been announced by the Allis-Chalmers Manufacturing Company. The first of this new line—the HD14—is now available and other models will be released in the near future. (See illustration on next page.)

The HD14 develops 130 horsepower on the belt, 106 horsepower on the drawbar, and weighs 27,000 pounds. The transmission with six forward speeds and two reverse provides forward speeds from 1.72 to 7.00 miles per hour and reverse speeds of 2.00 and 3.20 miles per hour.

The General Motors 2-cycle 6-cylinder engine is said to provide smoothness and performance never before possible in a Diesel engine. Allis-Chalmers, in testing this engine, has moved over two million cubic yards of earth on two of the toughest construction jobs in the country—the Rio Grande flood control system and the Pennsylvania Turnpike—in addition to extensive tests on logging jobs. This engine also makes possible throttle control of a tractor, giving a range of speeds in any gear down to half rated engine speed, without loss of drawbar pull.

Other features include the use of the new "positive seal" truck wheels, recently introduced by Allis-Chalmers, which eliminates the regular 10-hour greasing and requires lubrication only once every 200 hours. New and revolutionary steering clutches and brakes of a bi-metallic material are used which are said to make a marked reduction in maintenance expense by increasing the life of these parts many times.

Standard equipment includes heavy radiator guard, heavy full-width crankcase guard, heavy truck wheel guards, front pull hook, and muffler. Radiator shutters and electric starting are also standard equipment.

## • Wheeled Scraper

To meet the increasing demand for a scraper that will handle more "pay dirt" per pound draw bar pull, R. G. LeTourneau, Inc.,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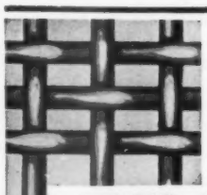
Portable Belt Conveyors—Buckets



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NO. 2,024,806
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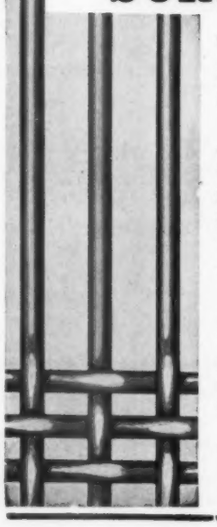
HIGH CAPACITY
SCREEN



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THE W. S. TYLER
COMPANY
Cleveland, Ohio

Diesel tractor pulling scraper.

has designed and placed on the market a new double-bucket, cable-controlled Model SU Carryall scraper rated at 14 cubic yards struck capacity and 18 heaped, shown below.

The scraper is designed to give maximum capacity for loading under normal conditions without the aid of a pusher and thus completely to utilize tractor power.

To minimize loading effort and make the greater yardage possible the scraper blade is narrowed and a patented double-bucket bowl used. The narrow cutting edge and two telescoping buckets give the effect of loading successively two small scrapers with a large tractor, and, according to the manufacturer, should result in capacity loads and extra yardages.

After loading the first bucket to capacity, it is drawn back while the second is being loaded. This double-bucket loading method is designed to eliminate costly voids in the rear of the bowl and at the top of the tail-gate.

The sheaves for pulling the tail-gate forward in unloading are placed in a vertical position on the sides, where they keep the cable out of the dirt and give a center pull on the tail-gate, reducing rail, roller, cable and tractor wear and strain.

A single adjustment for the two bucket catches with greater leverage synchronizes the two catches and prevents the tail-gate and buckets from jamming.

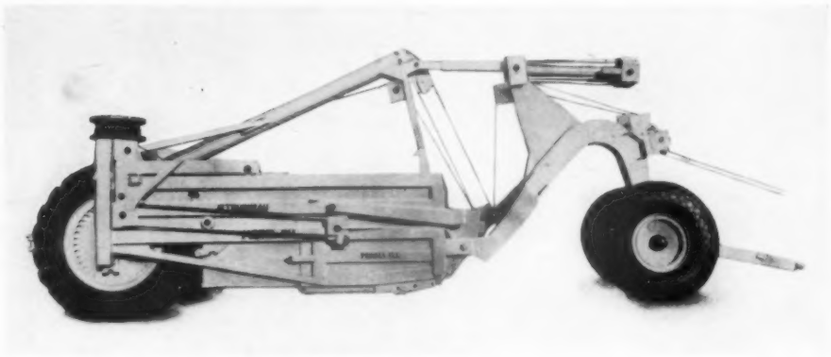
A new type yoke gives greater strength and additional clearance for sharp turning of the front wheels.

Higher sides reinforced by five channels prevent the loss of pay dirt from side spill.

### • Diesel Tractor

The Caterpillar Tractor Company has announced a new 75-drawbar horsepower Diesel D7 tractor, engineered specifically to increase production and lower operating costs.

To reduce operator fatigue, the new D7 tractor has "finger tip" steering. A light pull on the steering clutch lever is sufficient to steer the 23,500-pound machine.



New four-wheeled scraper.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Ideal for farm to market road work. Crushes stone to 1" minus or to fine agriculture dust.

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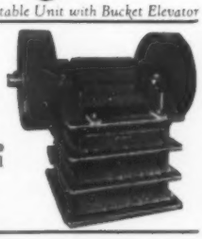

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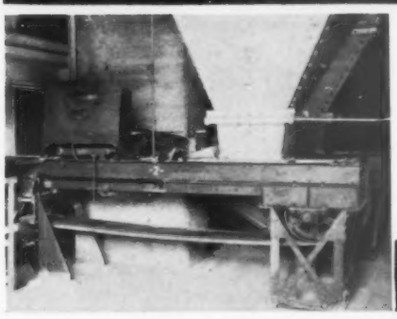

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Merrick Scale Mfg. Co.
Passaic, New Jersey

In order to obtain the greatest possible strength and at the same time keep weight within the correct limits, welded steel construction is used extensively. The frame and steering clutch case are of this construction, and are built into a one-piece unit.

The tractor is powered by a heavy-duty, four cylinder valve-in-head Caterpillar Diesel engine. To provide a broad range of speeds, the new D7 tractor is regularly equipped with either of two 5-speed transmissions.

The low speed transmission provides 5 forward speeds ranging from 1.4 m.p.h. to

New model Diesel tractor.

5.00 m.p.h.; while the high speed transmission has speeds from 1.4 m.p.h. to 6.00 m.p.h.

For each of the first four forward speeds, there is a corresponding but slightly higher reverse. This is obtained by means of a quick reverse shifting lever, which works independently of the change speed shifting lever. It is possible to change from any of the first four speeds to the corresponding reverse speed by merely pushing forward on one lever, the flywheel clutch having been first disengaged. This feature is particularly advantageous in bulldozing.

### • Locking Differential

For a great many years engineers in the automotive industry have made every effort to obtain a locking differential which operated automatically without manual assistance. To realize the importance of such a device, one only has to recall one of perhaps many instances in his own experience with a car or truck when one wheel loses its traction and the vehicle becomes entirely helpless, creating a set of needless circumstances such as loss of time, destructive shock to the vehicle's driving mechanism and possible expenses for repair, to say nothing of upsetting one's peace of mind.

The Thornton Tandem Company of Detroit, manufacturer of the Thornton four rear-wheel-drive for trucks, has been for more than sixteen months developing and testing under the most adverse circumstances, the Thornton automatic-locking differential, which is now being offered to truck users. The Thornton Differential is a self-contained package unit, interchangeable with standard axle differentials. The device is available for Chevrolet and Ford truck axles. Additional models are being developed for Dodge, International, General Motors, and other popular makes of truck axles.

## Trade Literature

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*Hercules Diesel Engines,* 16 pages. Hercules Motors Corporation, Canton, Ohio.

*Farrel GearFlex Couplings,* 44 pages. Farrel-Birmingham Company, Buffalo.

*The Facts You Want About Secondary Crushing,* 16 pages. Pioneer Jaw Crushers, 8 pages. Pioneer Engineerings Works, Minneapolis.

*Audubon Metalwove Conveyor Belts,* 44 pages. Audubon Wire Cloth Corporation, Philadelphia.

*Robins Modern Equipment,* 4 pages. Robins Conveying Belt Company, New York.

*Power-Factor and Its Improvement,* 16 pages. General Electric Company, Schenectady, New York.

*How to Build Your Own Engine-Driven Welder,* 6 pages. Lincoln Electric Company, Cleveland.

*How to Plan a Materials Handling System,* 8 pages. Cleveland Crane & Engineering Company, Wickliffe, Ohio.

*Traylor-Stearns Multi-Stage Fine Reduction Crusher,* 8 pages, Traylor Engineering & Manufacturing Company, Allentown, Pennsylvania.

*Commercial Presteel Close-Clearance Pallets,* 8 pages. The Commercial Shearing & Stamping Company, Youngstown, Ohio.

*Weldotron . . . a New Low Current Welder for Precision Work,* 8 pages. Allis-Chalmers Manufacturing Company, Milwaukee.

*Two Scraper Ropes,* 4 pages. Macwhyte Company, Kenosha, Wisconsin.

*Dempster Dumpster Pays Its Way,* 8 pages. Dempster Brothers, Inc., Knoxville, Tennessee.

*A New Bucket Loader with New Portability,* 4 pages. Barber-Greene Company, Aurora, Illinois.

*Marmon-Herrington All-Wheel-Drive Fords,* 12 pages. Marmon-Herrington Company, Inc., Indianapolis.


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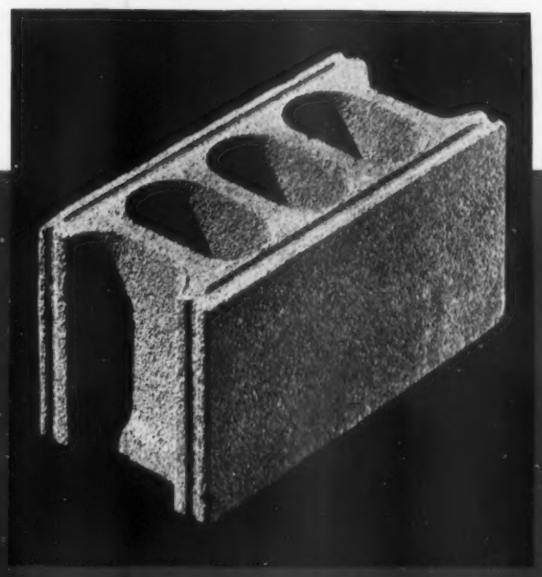

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All your customers want vibrated blocks, because of the Stearns Joltcrete blocks they have seen. *There is a vast difference in different forms of vibration.* Only the Stearns Joltcrete Machine is licensed under the patented method by which the mold box is vibrated while the material is under pressure—*limited amplitude* vibration.

And only in the case of Stearns Joltcrete units, have vibrated blocks proven—by authoritative tests*—their higher early strength, lower absorption, less volume change and extremely light weight when made of light aggregates.

* See Wisconsin Test Results as reported in the Journal of the American Concrete Institute, Nov., 1939.

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Stearns introduced a new method and a new machine in 1938. At first received with doubts, Stearns Joltcrete in twenty-four months has won almost universal acceptance. Over a hundred Stearns Joltcretes have been bought. In 1939 more than fifty million Stearns Joltcrete blocks were made and sold.

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STEARNS MANUFACTURING CO. - ADRIAN, MICH.
GEMS OLSEN, PRESIDENT

# The CONCRETE MANUFACTURER

February, 1940

A SPECIAL SECTION OF PIT AND QUARRY DEVOTED TO PRODUCTION MARKETING AND USES OF CONCRETE PRODUCTS AND READY-MIXED CONCRETE

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## Nation's Concrete-Products Manufacturers Will Gather at Washington, D. C. February 12 to 14

Early indications point to a large registration, especially among eastern producers, when the National Concrete Masonry Association gathers at the Mayflower Hotel, Washington, D. C., on February 12, 13 and 14.

The convention sessions will open promptly at 10 o'clock on Monday morning. This session will be devoted to subjects of an "inspirational" character and will point the way to a bigger and better concrete-products industry. In the afternoon the visitors will be guests of the National Bureau of Standards. The Bureau is planning an excellent program including fire tests on concrete-masonry walls.

Precast concrete floors will be the subject of discussion at the evening session, which will be held jointly with the Cast Stone Institute.

On Tuesday, February 13, promotion will again be the feature, with talks by top-ranking speakers, including representatives of the U. S. Housing Authority, the Federal Housing Administration and other Federal departments.

In the afternoon, the National Cinder Concrete Products Association will meet. The rest of the convention visitors will have the afternoon available for escorted sight-seeing trips.

The annual dinner-dance will be held Tuesday evening in the Grand Ballroom of the Mayflower.

Wednesday, February 14, has been set aside for a manufacturing session to hear discussions of new developments. One of the features of this session will be a discussion of the durability tests of vibrated and tamped units recently completed at the University of Wisconsin.

At the close of the gathering, a party of concrete-products men will take a post-convention vacation tour of Florida to observe the extensive use made in that state of concrete block. The party will leave by train for New York and board the S.S. Shawnee and debark about February 20 at Miami.

On the same dates, the Cast Stone Institute will also hold its annual meeting at the Mayflower Hotel. The Monday morning session will be devoted in part to discussion of a proposed plan to create increased confidence in cast stone through the use of the principle of the "bonded guarantee." If the plan is fully developed and adopted, the manufacturer who supplies cast stone for a building in accordance with an architect's specification will give a bonded guarantee that the product has been produced and cured in accordance with those specifications.

Monday afternoon will be taken up with an inspection trip which will include a visit to the U. S. Navy's Model Testing Basin Building—a notable structure faced with 2-inch cast-stone slabs that served as forming during construction. Among other buildings to be visited will be several important structures that feature the new type of mosaic cast stone.

The session on Tuesday morning will receive a report on the waterproofing studies being conducted by the Institute. Another subject will be a paper and demonstration covering the fundamentals of cement and concrete, with especial reference to their application to plant conditions.

On Tuesday afternoon the question of a "bonded guarantee" will again be up for discussion and a representative of the Federal Trade Commission will explain what a trade-practices conference could do for the cast-stone industry.

■

## Install New Truck Mixers

Jaeger truck-mixers have recently gone into service at the following ready-mixed-concrete plants: Harry T. Campbell Sons Company, Towason, Maryland; Yakima Cement Products Company, Yakima, Washington; and the W. T. Price Dredging Corporation, Miami.

■

## Ready-Mix Pioneer Dead

John Evans Donelson, 68, Birmingham engineer and said to be the originator of commercial ready-mixed concrete, died in a Birmingham hospital December 30.

Superintendent of the Sloss-Sheffield Steel & Iron Company's concrete plant since its construction in 1924, Mr. Donelson is credited with having originated the plan of selling the ready-mixed article and designed and erected the first plant of this type.

# Ready-Mixed-Concrete Manufacturers Meet to Discuss Operating Problems

THE National Ready Mixed Concrete Association can look back with pride on its tenth annual convention which, for attendance and interest, surpassed even the previous year's meeting. The 1940 meeting was held concurrently with the twenty-fourth annual convention of the National Sand and Gravel Association at the Jefferson Hotel, St. Louis, January 17 to 19. Some of the sessions were held jointly with those of the sand and gravel association and these are reported elsewhere in this issue of PIT AND QUARRY as a part of the sand-and-gravel convention report.

The first meeting of both associations was a joint session presided over by the presidents of both associations who both addressed those present. J. Rutledge Hill, Gifford-Hill & Company, Inc., spoke for the sand-and-gravel industry and James F. McCracken, American Builders' Supply Company, Louisville, for the ready-mixed-concrete industry. The other speakers at this meeting devoted their discussions to subjects of interest to members of both industries. Following this meeting was a luncheon for members of state associations in both industries. For details on the above proceedings the reader is referred to the sand-and-gravel report in this issue.

The first separate session of the National Ready Mixed Concrete Association on Wednesday afternoon was devoted almost entirely to operating problems. Attendance at this meeting was very good and the discussion was open and very interesting. H. F. Thomson, St. Louis, a director and past-president of the association, presided and opened the meeting by giving the annual report of the Standards Committee. He reviewed the development of specifications for truck-mixers and mentioned the new specification being considered which would alter the truck-mixer loading limits now in effect. The loading capacity would be raised from 50 to 57½ per cent., that of shrink-loaded mixers from 66⅔ to 70 per cent. and that of agitators was placed at 80 per cent. Some changes in mixing speeds, time, etc., are also suggested. The full text of these suggested specifications, said Mr. Thomson, will be forwarded to members who will be invited to vote on it. He suggested that the association sponsor a bureau for truck-mixers similar to the bureau operated by manufacturers of stationary concrete mixers and invited comments and suggestions.

Stanton Walker, director of engineering, spoke next on the *Design of Concrete Mixtures*.

Reviewing briefly the history of concrete design, Mr. Walker said:

"A Frenchman, Feret, stated principles for designing concrete as early as about 1892, and that Fuller and Thompson in the 1907 Proceedings of the American Society of Civil Engineers outlined a procedure based on their researches in connection with concrete for the New York Aqueduct. The principles outlined by Feret and by Fuller and Thompson were sound, and are sound to-day. . . . Abrams, from 1916 to about 1918 outlined, for the first time, a method for proportioning concrete on a quantitative basis. He demonstrated the dependence of the quality of the concrete on the amount of water expressed in terms of the cement. He also pointed to a well-defined empirical relation between the water requirements for concrete and the proportions and the grading of the aggregates as expressed by the fineness modulus. At about the same time Talbot and Richart described their void cement-ratio theory—another approach to the same problem. . . .

"The water-ratio principle, because of its simplicity and its basic soundness, has survived and has found universal application in specifications for proportioning concrete. Almost without exception, anything that has been written about the design of concrete mixtures in recent years has started with that principle as a basis.

"Since strength is about the only characteristic of concrete that can be measured directly, practically all design methods have used it as a criterion. That is, with given materials and stated conditions for plasticity, the proportions of cement, aggregates, and water to produce the required strength are determined. So far as 'quantitative' design is concerned, that is about as far as we can go at the present time and, in a large proportion of the cases, that is far enough. However, there are other characteristics which need to be considered and which the design methods referred to do not take into account. Prominent examples are durability and impermeability.

"I mention these factors not because I purpose to outline design procedures which comprehend them—the information to do that is not available—but as an explanation of certain specifications which appear to contain conflicting requirements. For example, many specifications require more cement and less water than is consistent with the strength demanded. That is for the purpose of protecting the durability of the concrete or another similar factor.

"However, it can be demonstrated that, in general, most of the important characteristics of the concrete vary as the strength. High-strength concrete is generally durable and impermeable concrete if the ingredients are of good quality. Therefore, if the strength specified is made consistent with the degree of exposure of the concrete — load, weather, or other agencies—that factor provides a good criterion for design.

"Of the many methods for design which have been advanced none are sufficiently accurate to arrive at 'guaranteed' strengths unless supplemented by laboratory tests. They are of principal usefulness—and this is an important function—in arriving at the most economical proportions; *i.e.*, those which will give the highest strength for a given cement content. The chief difficulty in designing for a specific strength, without the aid of laboratory strength tests, comes from the wide range in the strength-producing properties of different cements. Further, of course, no design for strength should ever be made which contemplates 'guaranteeing' the strength of field-cured specimens. All such designs should be based on laboratory curing. Because of differences in temperature and curing conditions in the field, there is no necessary direct relation (particularly at early ages) between the strength of concrete in the job and that

cured under laboratory conditions. However, strength tests of specimens cured under standard conditions (moist and at a temperature of 65 to 75 degrees F.) do provide an accurate criterion of the potential strength—and, hence, the quality—of job concrete.

"A fault of most concrete-design methods is that they are either too technical or too detailed to be attractive to the average practical engineer who does not specialize in that field. Nevertheless, such engineers do feel the need for a simple procedure which will furnish an approximate idea of the strength which will be obtained for given proportions, or the proportions required to produce given strengths. I shall describe such a procedure. There is nothing new about it. It is based on well-understood principles and is used by a number of engineers. It does not take into account differences in the grading of aggregate, except as to maximum size, but it does fit a wide range of aggregates with surprising accuracy. It has already been described by me in the National Sand and Gravel Association Technical Information Letter No. 2 (1938); the National Ready Mixed Concrete Association Technical Information Letter No. 1 (1938); and the Journal of the American Concrete Institute, January 1939.

"*Step 1.*—Assume, or otherwise arrive at, a water-ratio strength relationship. Table I gives a relatively 'conservative' one based on average moderate-strength cement and a 'probable' one based on results frequently obtained with modern cements.

"*Step 2.*—Assume, or otherwise arrive at, the quantity of mixing water per *cubic yard of concrete* required to produce the desired plasticity with the aggregate in question. For all practical purposes of this fairly 'rough-and-ready' method of design the quantity of mixing water per *cubic yard of concrete* will be approximately the same for different strengths, if the aggregate and the plasticity (slump) are the same.

"'Order-of-magnitude' values for average well-graded sand and gravel aggregates are given in Table II.

"*Step 3.*—Determine the number of sacks of cement per cubic yard of concrete. That can be done directly from the data in Tables I and II. Merely divide the number of gallons per cubic yard of concrete by the number of gallons per sack of cement. For example, under these assumptions and using the 'conservative' column for gallons per sack, a 3,000 p.s.i. concrete having a 3- to 4-inch slump would be produced with a well-graded 1½-inch top-size aggregate using 35 gallons of water per cubic yard of concrete (total, of course, including moisture) and $\frac{35}{6\frac{1}{2}} = 5.4$ sacks of cement per cubic yard of concrete. Similarly, a 2,000 p.s.i. concrete with a 3- to 4-inch slump would be produced with the 1½-inch aggregate using *(again)* 35 gallons of water per cubic yard of concrete and $\frac{35}{8} =$ 4.37 sacks of cement per cubic yard of concrete. Simple, isn't it? And, just about as accurate as more complicated methods if you know your aggregates to be of reasonably normal grading.

**Table I—WATER-RATIO STRENGTH RELATIONSHIP**

| Compressive Strength at 28 Days (*Standard Curing Lb. per Sq. In.*) | Water (*Gal. per Sack of Cement*) | |
|---|---|---|
| | Conservative | Probable |
| 2,000 | 8 | 8½ |
| 2,500 | 7½ | 8 |
| 3,000 | 6½ | 7¼ |
| 3,500 | 5¾ | 6½ |
| 4,000 | 5¼ | 6 |

**Left to right: F. N. Andersen, Andersen Sand and Gravel Company, Saginaw, Michigan; Henry N. Battjes, Grand Rapids Gravel Company, Grand Rapids, Michigan; Morgan H. Butler, Butler Bin Company, Waukesha, Wisconsin.**

**Table II—WATER REQUIRED BY AGGREGATES**

| Maximum Size of Gravel (*In.*) | Water Required (*Gal. per cu. yd. of Concrete*) (Assumed same for all strengths) | | |
|---|---|---|---|
| | 1-to 2-in. Slump | 3-to 4-in. Slump | 6-to 7-in. Slump |
| ¾ | 35 | 38 | 42 |
| 1 | 33 | 36 | 40 |
| 1½ | 32 | 35 | 39 |
| 2 | 30 | 33 | 36 |

"*Step 4.*—Determine the quantities of total aggregates per cubic yard of concrete. There are two simple methods. The first (A) is the easier and the less accurate. The second (B) is not much harder and much more accurate.

"A.—Assume a weight per cubic yard for your concrete. If you don't know it, consider 4,000 pounds close enough for normal gravel-aggregate concrete. The weight may be a little higher for your coarser gradings and a little lighter for your finer gradings, but that figure is a pretty good average. Now, you know the weights of cement and water; just subtract them from 4,000 pounds and you have your total aggregate. For example, in the first example given in Step 3, we have

35 gallons of water = 292 pounds
5.4 sacks of cement = 508 pounds
Total = 800 pounds
Sand and gravel = 4,000 − 800 = 3,200 pounds.

"B.—The more accurate method requires a knowledge of, or an assumption for, the specific gravity of your aggregates. Assume, for the purpose of this illustration, that the specific gravity is 2.63, and that is not a bad general value to assume. Then a *solid* cubic foot of your material—visualize one big piece of gravel a cubic foot in volume—weighs 2.63 × 62.5 = 164 pounds. A further assumption is that each 94-pound sack of cement contains ½ cubic foot of solid cement—0.485 is the more generally used figure.

"From the preceding we can calculate the volume of the cement paste—it is the volume of solid cement plus the volume of mixing water—per cubic yard of concrete. That quantity subtracted from 27 cubic feet gives the number of cubic feet of *solid* aggregate and that number multiplied by 164 gives the pounds of total aggregate.

"For example, in the first example given in Step 3 (the same as used in B) we have

35 gallons of water = 4.66 cubic feet
5.4 sacks of cement = 2.70 solid cubic feet
Total = 7.36 cubic feet of paste

**Table III—PROPORTIONS OF SAND AND GRAVEL**

| Maximum Size of Gravel (*In.*) | Sand (*per cent. by weight of total aggregate*) | |
|---|---|---|
| | Lean Mixes | Rich Mixes |
| ¾ | 50 | 40 |
| 1 | 47 | 37 |
| 1½ | 43 | 33 |
| 2 | 40 | 30 |

27 — 7.36 = 19.64 cubic feet of solid aggregate

19.64 × 164 = 3,220 pounds total aggregate.

"*Step 5.*—Determine the proportion of sand and gravel in the total aggregate. That depends to such a large extent on the grading of the aggregates that it is difficult to give approximations. . . . However, you know fairly well what the proportion should be from past experience and, in any event, it should represent the least quantity of sand which will produce a smooth workable mix. Some figures to shoot at are given in Table III.

"*Step 6.*—Having completed all your calculations it will be a good idea to boost all quantities about 1 or 2 per cent. as a factor of safety.

"The simple method outlined above has been represented as approximate. However, it is only as approximate as your assumptions. If you know the water-ratio strength relationship applicable to your materials and to the cement to be used and if you know, from experience or trial, the gallons of water per *cubic yard of concrete* required to produce the desired workability, accurate results will be arrived at."

Following Mr. Walker's paper and the ensuing discussion Mr. Thomson briefly outlined the new A.S.T.M. specifications for the field testing of concrete and advised all producers to get a copy of it. Knowledge of these specifications, he said, makes it possible for a producer to check the field-testing methods of users of his product and insure that they are truly representative of the product.

The open-forum discussion began with purchase specifications. R. V. Warren, Western Pennsylvania Sand and Gravel Association, Pittsburgh, said that in the Pittsburgh area specifications were based on strength and minimum cement content. The PWA and WPA permit the use of rinsing water in concrete provided that allowance is made for the exact amount in the next batch. The usual amount permitted is 20 gallons. According to Mr. Warren, mixing in transit is not permitted, this being done after the arrival of the truck at the job. This, he said, is done to insure the specified water content. All the aggregates for any one job must come from the same source. The mixer must be on a level plane when discharging at the job.

Mr. Walker said that mixing on the job is being required in more and more cases and suggested that producers give some study to ways of overcoming objections to mixing in transit. The reason for requiring mixers to be on a level at the job, he said, is to reduce segregation in discharging the concrete.

Stephen Stepanian, Arrow Sand & Gravel Company, Columbus, Ohio, who was one of the first to produce ready-mixed concrete and to design a truck-mixer, said that prohibition of mixing in transit would eliminate the time saving which is one of the chief advantages of ready-mixed concrete. He also stated that there is urgent need for a quick method for determining the moisture content in an aggregate.

Mr. Walker also stressed this need and commented on the failure of many producers to use such control methods as are now available. He stated that any producer who is familiar with his local aggregates should be able to guess the moisture content within ¼ to 1 per cent.

Mr. Warren warned that more and more restrictions will be placed on the methods of producing ready-mixed concrete and that producers must be prepared for them.

Alexander Foster, Jr., Warner Company, Philadelphia, said that in his city central mixing is required with an inspector always at the plant. Efforts are also made to get producers to use a plant mixer of half the capacity of the agitator trucks so that the second batch going into a truck can make up for any deficiencies in the first. The time of haul is limited to one hour, according to Mr. Foster. The aggregates and cement must be weighed and the water either measured or weighed.

Lion Gardiner, Jaeger Machine Company, Columbus, said that a device developed in the Los Angeles area made a quick determination of moisture content possible. This device is a small hydrometer which determines the moisture content of sand in from 10 to 15 seconds.

The length of haul of plant-mixed or transit-mixed concrete was the next subject brought up for discussion. T. E. Popplewell, Fort Worth Sand & Gravel Co., Fort Worth, said that his company hauls plant-mixed concrete up to 20 miles. The state highway department limits hauls to 1 hour.

Alexander Foster, Jr., said that when plant-mixed concrete is agitated for 15 miles or more a core of concrete of a different color from the rest of the load is created. This condition, he said, is especially noticeable in warm weather, when the agitator is loaded to about 80 per cent. of its capacity.

H. F. G. Pelsue, Graham Brothers, Inc., Los Angeles, said that his company makes deliveries up to 1 hour using slow mixer speeds. Hauls of 10 to 14 miles are common in oil field work.

H. F. Thomson pointed out that the cost element usually limits the length of haul. Chas. P. Maloney, Maloney Concrete Company, Washington, D. C., said that his company loads its truck mixers at five different points which are so located that no deliveries need be made over distances greater than 5 miles. The average round trip made is now 3½ miles. Limiting the length of haul gets maximum quantities of concrete through a truck-mixer, which in his opinion is the primary requirement for profitable operation.

Mr. Stepanian cited the savings made by his company on large jobs by using a transfer plant for loading truck mixers near the job. (See P & Q, February, 1939, page 66.)

D. C. Brown, Dallas Concrete Company, Dallas, cited his company's experience in using a transfer plant near a large job. The aggregates are dry-batched and hauled to the site at a cost of 4 to 5 cents per cubic yard per mile and the transfer plant adds 10 cents per cubic yard to the cost. With this system a small fleet of trucks can handle a large job and each truck can haul about 4 loads per hour. This is done at a considerable saving as compared with long hauls.

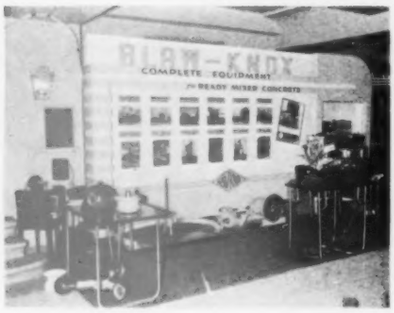
Mr. Walker remarked that some specifications permit hauls up to 1½ hour. He also commented on the lack of information on the effect of the length of haul on concrete.

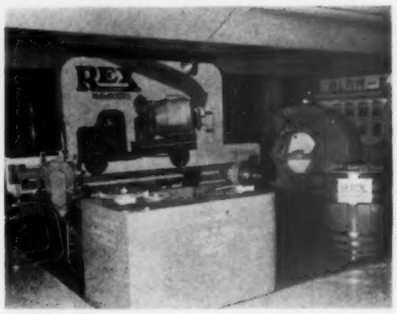
Henry Beckley, Beckley & Myers Company, Springfield, Ohio, said that on long hauls it was his company's practice not to add water to the batched aggregates and cement until within 6 or 8 minutes of reaching the job. He said that there has never been any objection to this procedure by any purchaser.

Mr. Walker remarked that many specifications now require that the mixing water be added at the plant. Another specification now being prepared requires that water be added to the mixture within ½-hour after the cement has been added.

According to E. B. Rayburn, Jr., Ready Mixed Concrete Company, Indianapolis, his company has had concrete already mixed held up as long as 1½ hour at a job before it was poured. No trouble was ever experienced except in extremely hot weather. At night concrete has been held up as much as 3 hours by job delays with no rejections. Mr. Rayburn also stated

# READY-MIXED-CONCRETE EXHIBITS



**Reading Down, Left column: Blaw-Knox Co., Brooks-Taylor Co., Butler Bin Co. Center column: Chain Belt Co., Conserco, Inc. Right column: Jaeger Machine Co., Ransome Concrete Machinery Co., T. L. Smith Co.**

that the loss of consistency of the concrete due to delays varied with the brands of cement used. Some brands began to lose consistency within 45 minutes, others not until after 3 hours or more.

According to H. F. Thomson, his company has made deliveries taking up to 1¾ hour and has had no trouble of any kind.

W. A. Bliss, Dravo Corporation, Pittsburgh, cited his company's experience on one 2,000-cubic yard order where, for reasons of reciprocity, on the part of the purchaser, 10 different brands of cement were specified and used.

A discussion of cold-weather operating problems was begun by Mr. Foster, who gave his company's experiences. By heating only the mixing water it is able to deliver concrete at the job at temperatures of 55 to 60 degrees F. This heating is done at a cost of from 3 to 5 cents per cubic yard, depending on the capacity at which the plant is operating. He said that temperature losses of 3 to 4 degrees F. are experienced in a 3- to 4-mile haul with an outside temperature of about 20 degrees F.

Paul P. Bird, Boston Sand & Gravel Company, Boston, cited his experiences. Aggregates are heated by steam pipes in the bins and in very cold weather steam jets are also used. The heating cost is from 3 to 5 cents per cubic yard. According to Mr. Bird, the temperature of concrete heated to 60 degrees F. at the plant often rose several degrees on short hauls but on longer hauls fell several degrees. Concrete heated to 70 degrees F. at the plant showed a lower slump on its arrival at the job.

Henry H. Bayerl, Portsmouth Mixed Concrete Company, Portsmouth, Ohio, said that his company used a boiler to heat water to a temperature of 200 degrees F. and added it to the aggregates in the truck-mixer before adding the cement. Hot water is also kept in the auxiliary tank on the mixer and 80 gallons is used to wash out the drum on the return trip.

F. N. Andersen, Andersen Sand & Gravel Company, Saginaw, Michigan, said that 4-inch steam coils have been used successfully to heat aggregates in his bins. The mixing water is also heated to 180 to 200 degrees F. The state highway department requires concrete to be heated to between 70 and 80 degrees F. at the plant. On a 15- to 20-mile haul, he said, the concrete temperature usually dropped several degrees but sometimes showed a gain of a few degrees. The slump at the job was usually about ½ inch less than it was 5 minutes after the start of mixing. According to Mr. Andersen, delays on the job caused no additional slump loss and no material temperature change.

Mr. Rayburn said that tests show that concrete heated to 125 degrees F. in the mixer begins to get its initial set almost immediately after it leaves the mixer. No one present knew of any specifications limiting the maximum temperature of mixing water but it was brought out that most specifications limit the maximum temperature of concrete to 90 degrees F. or less.

Mr. Gardner said that experiments have been made in which the water and cement were mixed for 1 minute before the aggregates were added. No advantages were obtained.

Irving Warner, Warner Company, Philadelphia, cited his practice of holding back the cement feed until the ag-

gregates had time to reduce the water temperature, thus preventing flash set.

Another producer from Milwaukee said it was his company's practice to put water and then aggregates in the mixer, starting the cement feed when half the aggregates were in. A torch is used for additional heating in the mixer. Concrete is usually heated to about 70 degrees F. An instance was cited where a contractor insisted on 90-degree concrete with disastrous results.

The methods of handling concrete were next discussed. Mr. Pelsue told of some extremes in service being offered by several producers, not including his company, in the Los Angeles area who are delivering concrete to the second and third floors of buildings under construction.

Mr. Maloney opposed going to such extremes to get business. In Washington, he said, users are charged for truck waiting time. Some of his trucks handle 45,000 cubic yards of concrete annually, 60 per cent. of which is used in residential construction. In Washington, he said, almost all concrete used is ready-mixed and the small job mixer is non-existent. The regular tests required by the city drove out the job mixers, according to Mr. Maloney.

Mr. Walker also stated that the safest policy was to offer only limited facilities to the contractor and not try to do his work for him. Once started, there is no end to this type of service.

William E. Code, Hunters Point Lumber & Supply Company, Long Island City, New York, told how the enforcement of building codes greatly increased the demand for ready-mixed concrete in the building of small houses.

Mr. Pelsue brought out the importance to concrete producers of inspection of the concrete going into small house construction.

Mr. Thomson mentioned a Detroit code requirement under which a contractor must notify the proper authorities the day before concrete is to be poured so that an inspector can be on hand.

J. F. McCracken, American Builders' Supply Company, Louisville, said that his company furnishes job hoppers gratis to contractors, to save the waiting time for truck-mixers. On comparatively small jobs, he said, this service pays.

Quantity measurement was the next subject discussed. D. D. Reynolds, Boston Sand & Gravel Company, advised against selling concrete on the basis of the volume of the forms. Mr. Code, who was formerly a contractor, said that the loss from leakage, overflow of chutes, swelling of forms, etc., made form measurement inadvisable.

The subject of testing brought out some interesting practices. Mr. Andersen said that his company makes occasional test cylinders and has them tested by a commercial laboratory. If a contractor wants additional cylinders made he pays for them. Mr. Pelsue's company also makes control cylinders but furnishes no additional cylinders to customers. Mr. Bird's company makes cylinders at the start of a job, but later cylinders are made at the contractor's expense.

Mr. Rayburn commented on the carelessness of some contractors with test cylinders. He finds a tendency on their part, especially in the spring, to leave cylinders out overnight in 30- to 40-degree temperatures and later complain about the low compressive strengths shown. This year, he said, letters are being sent out asking customers to protect the cylinders during their curing periods.

Mr. Beckley said that his company makes a pair of cylinders for every 100 cubic yards of concrete and keeps a permanent record of them for its own protection.

C. W. Shirey, Waterloo, Iowa, said he pays for all the cylinders on large jobs and finds that it pays, as such service helps to take work away from job mixers.

Mr. Anderson has a 70-degree curing vat at his plant and he insists that all cylinders be cured in it.

V. P. Ahearn, Executive Secretary, then gave his annual report beginning with a brief *resumé* of the meeting of the board of directors in New York City on June 16. He also reported on routine matters.

An open forum was then held on a proposed outline for a sales manual for the ready-mixed-concrete industry, the preparation of which had been placed in the hands of a committee headed by Mr. Pelsue, with Mr. Thomson and R. C. Collins as the other members. This manual, when finally prepared and published, will include specific recommendations for merchandising policies, the development of wider markets for ready-mixed concrete while preserving existing outlets, effective advertising media, the considerations which companies should observe in urging the use of ready-mixed concrete, the emphasis to be laid on quality by ready-mixed-concrete companies, the type of construction work best suited for the use of ready-mixed concrete, improvements in service and delivery, engineering supervision and testing, and the many other questions which every ready-mixed-concrete operator faces in maintaining his place in the market.

Following is the suggested outline of subject matter for this sales manual.

*History*—
- (a) Brief statement regarding concrete as material of construction.
- (b) Transition to ready-mixed concrete.
- (c) The acceptance of the Abrams water-cement ratio theory as sound engineering by the engineering profession, and the adaptability of the ready-mixed concrete method to this procedure has caused rapid expansion in growth of ready-mixed concrete.
- (d) Origin and development of National Ready - Mixed Concrete Association, trained engineering personnel, laboratory facilities, etc.

*Company Organization* (Text to be developed by individual company.)—
- (a) History of company.
- (b) Plant facilities—source of supply—capacity—etc.
- (c) Engineering supervision, testing, reports, forms, etc.
- (d) Delivery facilities, job service man-routes, etc.

*What Is Ready-Mixed Concrete?*—
1. Description of—
   - (a) Central-mixed concrete.
   - (b) Truck-mixed concrete.
2. Essential facilities and personnel.
   - (a) Overhead bins of proper design.
   - (b) Accurate weighing devices.
   - (c) Accurate water measurement.
   - (d) Equipment for moisture determination.
   - (e) Trained personnel capable of—
     - 1—Designing mixes.
     - 2—Testing aggregates.
     - 3—Determining percentage of free moisture.
     - 4—Accurate operation of weighing and measuring devices.
     - 5—Determining slump.
     - 6—Making test cylinders.
     - 7—Properly servicing deliveries.

*Pricing*—

The pricing of ready-mixed concrete should be based on executive policy established by the individual company.

The selling price of ready-mixed concrete, however, should always give due consideration to the cost of aggregates delivered to the job, *plus* job mixing costs, *plus* savings which accrue to the contractor by the use of ready-mixed concrete.

*Advantages of Ready-Mixed Concrete vs. Job-Mixed*—
1. Ordering of materials.
2. Ready-mixed concrete producer assumes responsibility of meeting specifications.
3. Reduced labor on job, insurance, etc.
4. Eliminates investment in mixing equipment.
5. Larger pours and more cubic yards placed per man-hour.
6. No waste of materials or loss of cement sacks.
7. More consistent uniformity which results in easier placing, reduced honeycombs, easier stripping.
8. Saving of job space.
9. Contractor can do more work without increasing capital.
10. Elimination of job-mixing problems permit job superintendent to function more efficiently.

*Company Sales Policy* (Text to be developed by individual company.)—
- (a) Methods of sales, direct or through dealers.
- (b) Credits.
- (c) Admixtures, special mixes or aggregates, cylinders, testing, etc.

*Service*—
1. Careful booking of orders.
2. Care in promising deliveries.

A group of salesmen and prospective customers at one of the mixer manufacturers' booths studying an operating model.

3. Conscientious fulfillment of promises made.
4. Necessity of contractor coöperation.
5. Adequate personnel to check jobs—
   (a) To see that proper roadways are provided.
   (b) To see that job is not overserviced.
   (c) To see that orders are placed on time.
   (d) To facilitate release of trucks on job.
   (e) To advise on suitability of concrete being delivered to meet job conditions.

*Questions and Answers*—
(a) What is meant by W/C ratio?
(b) What is Portland cement?
(c) What is meant by "slump" and how is it determined?
(d) What methods are used in designing mixes to produce concrete of a predetermined strength and plasticity?
(e) What method is used to determine weight per cubic foot of aggregate?
   1. Damp and loose.
   2. Dry and loose.
   3. Dry and rodded.
(f) How can we quickly find the percentage of voids in aggregates?
(g) How is yield determined?
(h) What is meant by "specific gravity"?
(i) What is a screen analysis?

*Specifications*—
Statement as to why specifications are written. Must be checked carefully by ready-mixed-concrete producer before quoting to assure himself that his materials and facilities fully comply.
Some pertinent specifications to be studied are:
A.S.T.M.—Ready-mixed concrete, test specimens, moisture, gradings, etc.
N.R.M.C.A.—Truck-mixer and agitator standards.
A.C.I.—Reports on recommended practices regarding mixing, placing, vibrating, etc.
Methods of specifying quality of concrete—
Proportions.
Cement content.
Strength.
Water-cement ratio.

*Sales Cautions* (To be developed by individual company.)—
List "do's" and "dont's" of salesmanship.

*Advertising*
1. Each company's advertising will be essentially local in its scope.
2. Therefore, the publicity is to be aimed at an audience which is quite readily selected, and the advertising should be specific and calculated to support personalized selling effort.
3. The breakdown of the buying and specifying public would be:
   (a) Contractors and operative builders.
   (b) Architects and engineers.
   (c) Owners.
   (d) Realtors, building-loan association officers, trust company real-estate-department heads.
   (e) The general public for "good will," etc.
4. Media which may be used:
   (a) Direct mail.
   (b) Newspaper advertising.
   (c) House organs.
   (d) Pictures.
   (e) Job and truck signs.
   (f) Coöperation with builders.

The annual report of the board of directors was then given and this was followed by a dramatic sketch, *Trials of a Ready-Mixed-Concrete Operator,* played by members of the organization of the General Materials Company, St. Louis. This was followed by the election of the following officers for 1940: J. H. Dixey, president; H. F. G. Pelsue, Stephen Stepanian, and A. J. O'Connor, vice-presidents; Don Reynolds, secretary; Alexander Foster, treasurer; Alexander Johnson, member-at-large.

Friday afternoon a joint meeting of the two associations was held. This session was executive in character and was devoted exclusively to labor relations. No quotation of any of the speakers was permitted.

The Friday morning session was presided over by H. F. G. Pelsue, Graham Brothers, Inc., Los Angeles. Stanton Walker, director of engineering, presented his annual report, which follows in part:

"The ready-mixed-concrete industry has been recognized as an integral and permanent part of the building industry for the past ten years. While the industry was born some twenty years ago, its principal development has occurred during the last decade.

"It is unfortunate that there are no authentic statistics showing the rate of growth of the industry. In 1925 there were only about 25 plants and in 1929 there were probably fewer than 100. By 1937 the association had compiled a list of 572 producers and to-day it includes 656. Undoubtedly, there are a number of operators of whom we do not have a record. A guess at 1929 production would place it somewhere in the neighborhood of 1,500,000 cubic yards. During 1930 and 1931 there was a rapid growth in the industry and perhaps production approached 5,000,000 cubic yards. For 1933, 1934, 1935 and 1936 we have figures on which some dependence may be placed and they show 2,600,000 for 1933; 3,200,000 for 1934; 3,500,000 for 1935; and 4,700,000 for 1936. The years 1935 and 1936 represented another period of accelerated growth and many new operators entered the industry. A questionnaire sent to 572 producers in 1937 elicited a response from 230 showing production of more than 6,000,000 cubic yards. There is no accurate method for expanding that figure to take into account the 340-odd producers who did not report, but a total production of 10,000,000 cubic yards would not appear to be a bad guess. On that basis it may be estimated that about 10,000,000 cubic yards would also represent the production for 1939 with that in 1938 at a somewhat lower figure.

"The association, due to small staff and facilities, has not done as much work in collecting industry information of the type just cited as is believed would be desirable. Data on total production, the distribution of production as between regularly established operators and contractors and information with respect to trends in the method of production *(i.e.,* central mixing or transit mixing) would appear to be of value. . . .

"The planning of our major engineering activities is delegated to the Technical Problems Committee. That committee, in turn, delegates the conduct of work planned by it to various working committees and to the director of engineering. A principal working committee is that on the general subject of standards. Three additional committees, subordinate to the Standards Committee, have to do with the development of standards for truck-mixers and agitators.

"The staff of the Engineering Division devotes its principal time to miscellaneous problems which arise from time to time. Numerous communications are received from member companies and from users of concrete re-

questing information on specifications, test methods, methods for designing concrete, industry practices in one respect or another, or presenting some problem which requires conferences with some of the many bureaus in Washington or with local specification bodies. It is difficult to give an accounting of such activities. Nevertheless, we consider them as representing one of the principal justifications for the existence of the division. We welcome and solicit requests for our services.

"In spite of the predominance of miscellaneous work of the nature referred to, the association has found the time to carry out a number of specific activities which, we are sure, have been of benefit to the industry and have been responsible in a large measure for the recognition of ready-mixed concrete in the construction field.

*"Specifications.*—Unquestionably the most important activity of the association has had to do with coöperating in the preparation of specifications. One of our first efforts was, as you will remember, that of inducing the American Society for Testing Materials to prepare a specification for ready-mixed concrete. That specification was first issued in 1933 and has been revised from time to time since then. To keep it in line with current practice has required the continuing attention of representatives of the industry. Still further revisions are under discussion. That specification has been a most potent influence in guiding practices in various localities.

"The report of the Joint Committee on Specification for Concrete and Reinforced Concrete is about to be published. Included in it are requirements for ready-mixed concrete consistent with recommendations of the association. In the absence of facilities for a concerted action in arriving at recommendations it is difficult to visualize the nature of requirements which might have been included.

"A number of opportunities have been afforded the association to make recommendations with respect to specifications to various purchasing bodies such as state highway departments, cities and various Federal departments. As I reported to you last year, only three state highway departments are silent with respect to ready-mixed concrete (Arizona, Idaho and Montana) and that situation may have been corrected during the year.

*"Standards for Truck-Mixers and Agitators.*—An important activity undertaken by the association several years ago was that of the preparation of standards for equipment. The membership is sufficiently well-informed on that subject that it requires little discussion. Briefly, a tentative standard and recommended practice covering truck-mixers and agitators of the revolving drum type was issued in 1937. Those recommendations have been incorporated with only minor changes in most of the outstanding specifications, such as those which have just been mentioned. Since the promulgation of those tentative standards, consideration has been given to similar recommendations covering truck-mixers and agitators of the revolving-blade type. Tentative standards and recommended practices for that type of equipment were issued by the association in August of this year as a result of action taken by the board of directors at its meeting held in New York in June.

"During the year there have also been before us for discussion recommendations covering the operation of the inclined, conical-drum type of truck-mixer and agitator. Those recommendations have been subjected to close study and extensive discussions but no final action was taken with respect to them during 1939.

"It was evident to all having to do with the preparation of standards for truck-mixers and agitators that the issuing of two or three independent recommendations from the association would lead to confusion. As a result there was prepared, during 1939, and submitted for consideration of appropriate committees at this convention, a single specification covering all the more important types of truck-mixers and agitators now used by the industry. That proposed combined specification was the subject of discussion of a joint meeting of the board of directors and of Technical Committees of the association held on January 16. . . .

*"Publications.*—During the current year the association has issued no publications, although it has continued to distribute, on request, a large number of those which have been prepared in earlier years. Among our "best sellers" are our reprints of the American Society for Testing Materials *Standard Specifications for Ready-Mixed Concrete;* the bulletin on *Proportioning of Concrete for Strength, Durability and Impermeability* by A. T. Goldbeck of the National Crushed Stone Association; the paper on *Merchandising Designed Concrete* by H. F. Thomson; the paper on *Economics of Ready-Mix Versus Job-Mix Concrete* by R. L. Bertin reprinted from the Proceedings of the American Concrete Institute; the paper, *A Study of the Economics of High Strength Concrete in Building Construction,* by Frank E. Richart, first presented before our convention and later presented before the American Concrete Institute and reprinted from the Proceedings of that organization; and the bulletin on *Estimating Quantities for Concrete* by myself. . . .

"We have coöperated in the preparation of at least one publication dealing with ready-mixed concrete which appeared last year in the PIT AND QUARRY HANDBOOK and which will be reprinted this year in slightly revised form. The general discussion of the industry in that article was prepared by Messrs. P. J. Freeman, Arthur A. Levison and H. F. Thomson. I prepared the section on 'Specifications.'

*"Miscellaneous Activities.* — As pointed out previously it would be impossible to give a complete account of our many miscellaneous activities.

*(Continued on page 83)*

Left to right, Seated: G. K. Viall, A. E. Miller, M. Mills, and B. T. Devine, all of the Chain Belt Company. Standing: H. F. Thomson, General Materials Company, St. Louis.

The company's office is located in the corner of the plant building. The aggregate storage, handling and processing department is in the left background.

# Pioneer Products Manufacturer Quick To Adopt Improved Production Methods

ONE of the first to offer concrete building units in quantity in the great Middle Western territory, the Ideal Cement Stone Company, Omaha, Nebraska, has retained its high ranking position in this industry by an alertness to new developments in manufacturing processes, sound merchandising principles and a high-grade product. This company has had a progressively prosperous history. Its management has always kept its equipment up to high efficiency and has never hesitated to make complete changes in methods in the light of technological advances. It starts 1940 with new equipment and productive capacity, new office quarters and with the momentum of one of its best years behind it.

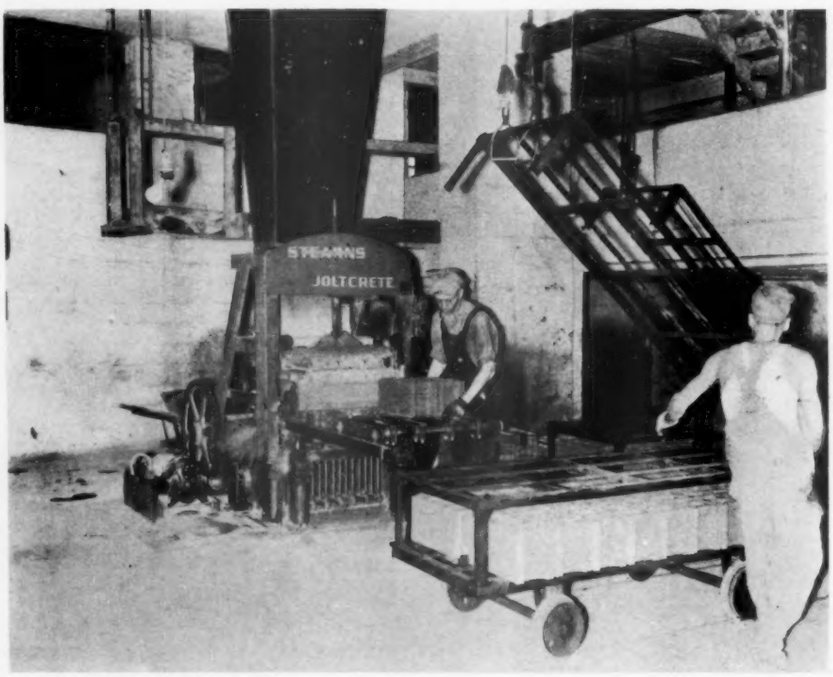
All the aggregates used in this plant are received by railway, graded sand and pea gravel coming from Platte River pits and cinders from the Omaha plant of the Nebraska Power Company. They are unloaded by a Byers electric crane with a ¾-cubic yard bucket into stock-piles or the three plant bins. The company also sells aggregates, and two of these bins are used for truck loading. The other 2-compartment bin is used for all the plant operations. The cinders are screened, the oversize going to a double-roll crusher, and are then rehandled by the crane into the plant bin as needed.

Under the plant bin is a 1-cubic yard volumetric measuring larry on overhead rails. Stairs attached to this larry enable the operator to reach the bin gate levers and see inside the batcher to get the right measurement. This larry serves the Stearns plant mixers which feed the block machines. A 14-cubic foot mixer serves an old Ideal face-down machine which now makes rock-face blocks, bush-hammer blocks and 4-inch solid blocks for fireplaces. This mixer also supplies an Anchor stripper block machine which is now seldom used.

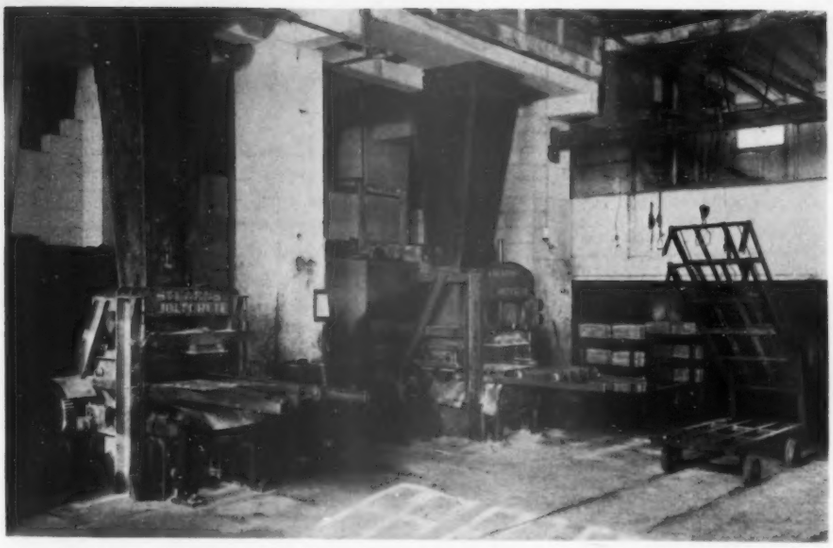
An Ideal 21-cubic foot mixer supplies the No. 7 Stearns Joltcrete automatic block machine which is used to make 8- and 12-inch blocks and all the specials, end blocks, partial blocks, etc. This machine makes one 12-inch or two 8-inch blocks at one time.

The new Stearns 28-cubic foot mixer feeds the large No. 9 Stearns Joltcrete block machine on which 3-, 4-, 8- and 12-inch blocks are made. This machine makes at one time two 12-inch, three 8-inch, six 4-inch or eight 3-inch blocks. This mixer has the new geared-head motor drive which eliminates exposed gears, jack-shaft, clutch, and pulley. It is also equipped with interchangeable hardened-steel bar-type liners.

In this plant there are also a number of machines for making various other products. Six additional mixers are used to supply these machines. An R & L joist machine installed three years ago makes 8- and 10-inch joists up to 20 feet in length. The other machines




The large block machine on which 3-, 4-, 8- and 12-inch blocks are made. Hinged racks on car are lifted out of the way while loading.



A partial view of the production department showing the two new automatic vibrated-block machines. Tunnel to kilns is behind cars at right.

are used to make chimney blocks, fractional face blocks, concrete bricks, etc. A wide range of molds are used for the manufacture of dimension stone, including coping, sills, lintels, etc., but no trim stone is made. A Thor pneumatic tamper is used to make the trim and ornamental stone. Bird baths, lawn seats, flower vases, sun dials, stepping stones, garden furniture and other ornamental concrete products are also made.

Blocks are loaded from the machines on Chase rack cars with hinged racks which are lifted up out of the way while the lower racks are being loaded. A hook on a counterweighted-pulley arrangement holds the racks. Barrett lift trucks are used to haul some of the other products, including joists and trim stone.

All the products are subjected to low-pressure steam curing in a row of single-track kilns, arranged on either side of a long tunnel. These have storage space for about 1½ day's production or about 200 carloads. The use of many small kilns makes it possible to fill each one quickly, getting the steam on the blocks sooner than if large kilns were used. Roller-conveyors are used to move the cured products from the kilns to outdoor storage piles. From 30,000 to 100,000 blocks and large quantities of other products are kept in yard storage. The company owns six delivery trucks which are kept in a concrete-block garage in which there is also a repair shop.

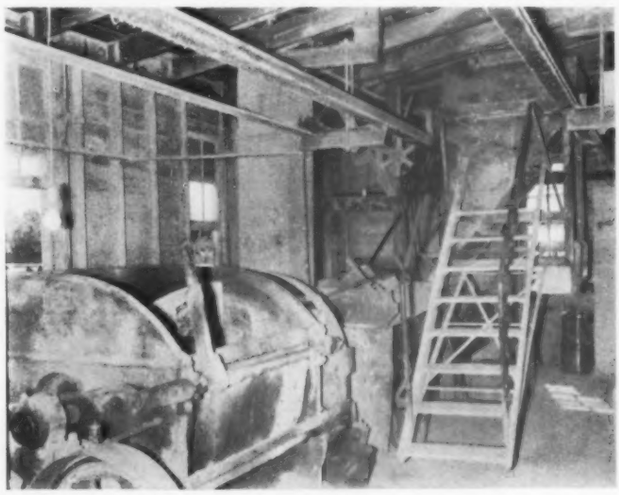
Ordinarily a 12-man crew operates the plant. Two men operate the No. 9 Joltcrete, one man the No. 7 Joltcrete, one the hand stripper, one the face-down machine and two the mixers. There are also five kiln and yard men. The size and allocation of the force is, of course, subject to considerable variation due to the extremely wide range of the products.

The company's product goes into all manner of construction—residences, industrial and commercial buildings, superstructure, foundation and back-up. The company can supply a complete concrete house up to the roof joists. No contracting or architectural work is done by the company but prospective customers are put in touch with contractors, architects, etc. Messrs. Peterson and Johnson, executives of the Ideal company, were quick to see the advantages of the new vibration process of

A typical advertisement used by the company in local newspapers.

block manufacture and tested out their market by offering first the output of the No. 9 Joltcrete machine. So quick was the response of architects and builders that greater manufacturing capacity immediately became necessary, resulting in the installation of a second Joltcrete, a Model 7.

"The finer quality and appearance of the vibrated blocks," says Mr. Johnson, "are so apparent that even casual passers-by have stopped to examine them on many jobs, making the comment 'I never before saw such nice concrete blocks.' They are impressed by the pleasing texture and clean-cut appearance produced by the sharp edges and



At left is the 1-cubic yard volumetric measuring larry for aggregates and some of the mixers into which it feeds. At right is the new 28-cubic foot mixer with its geared-head motor drive.

perfect molding of the blocks.

When laboratory tests, showing load-bearing capacities of over 1,600 pounds per square inch (gross area) and absorption of less than 5 per cent. are submitted there is always further favorable reaction.

Twenty standard blocks are made from a sack of cement. All blocks made on both Joltcrete machines have hand holds and mortar grooves all the way around at both front and back edges.

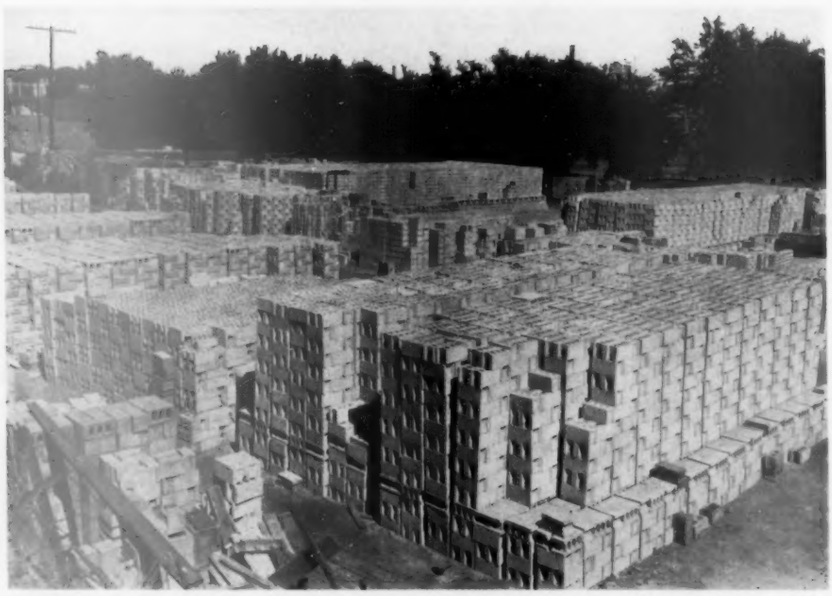
"The Joltcrete machines have effected some saving in labor cost and, also, our material costs have been reduced."

The company's selling methods are as modern as its manufacturing processes. It uses practically every accepted advertising medium except billboards. Every Sunday it runs an advertisement on the building page of the newspaper. It uses job signs and exhibits at building shows and similar expositions. Its printed matter, constantly and intelligently circulated among builders, architects, industrialists, bankers and others interested in construction, is far above the average of that used by concrete-products manufacturers. One mailing folder, printed in red and black, shows its 3-, 4-, 8- and 12-inch Joltcrete blocks, with superimposed diagrams calling attention to the uniform texture, the true lines of the units resulting in that straight horizontal mortar joint that masons insist upon, the continuous mortar groove, the easy hand hold and other features. The product is trade-marked "Star" blocks, and wherever advertised the point is stressed that the blocks are vibrated under pressure.

Another well-printed folder displays the plant's line of ornamental concrete. This department has always been an important factor in the Ideal company's business. In this division the R & L lightweight joists are made, as well as sills and lintels.

The Ideal Cement Stone Company was founded in 1906 by N. J. Peterson and Charles Peterson, who is now president. A. V. Johnson, now vice-president and treasurer, joined the company in 1913. Upon the death of N. J. Peterson in 1927 his son, Earl W. Peterson, became secretary of the company.

The original plant was equipped with two Ideal hand-tamp machines, each producing about 200 blocks daily. In 1908 an Ideal power tamper was installed. Additional power tampers were installed from time to time as demand increased until a total of 11 or 12 were in use, each making 500 blocks daily. In 1918 some of these machines were moved into another plant in the southern section of the city which was then growing rapidly. In 1929 two Anchor semi-automatic tampers were put into service and these were used until the two new Stearns Joltcrete machines went into service late in 1939. Together these are producing about 6,500 standard blocks daily. When business in this grain-belt metropolis began to fall off during the depression the south-side plant was given up and all production centered in the main plant.



Above: The company's office which is also an exhibit of its products. Charles Peterson, president of the company was unfortunately vacationing in Florida when this picture was taken. A. V. Johnson, vice-president, and other members of the organization are shown at work. Below: This view of the storage yard shows the large stock of the various products made.

## Concrete Silo Makers Discuss Standards

More rigid standards, leading to higher quality and resistance to absorption, was the theme of the annual meeting of the National Association of Concrete Silo Manufacturers held December 4 and 5 at the Palmer House, Chicago.

Speakers included Paul Woodworth, Portland Cement Association; and D. G. Miller, senior drainage engineer, U. S. Department of Agriculture.

The organization elected F. L. Christy of the Marietta Concrete Corporation, Marion, Ohio as its president, succeeding W. W. Gurney of the Madison Silo Company, Winona, Minnesota. Z. W. Craine of Craine, Inc., Norwich, New York, was again named secretary and treasurer.

Larson Cement Products Company, Omaha, Nebraska, has installed a new Stearns Clipper Stripper equipped with power feeder, power tamper, power strip, power strike-off and off-bearer.

# Many Original Methods Are Used By This Concrete Producer

By W. E. TRAUFFER

A general view of the yard of the S. H. Bacon Materials Company with concrete batching plant at right. A truck-mixer is coming out of the gate at left.

AT rare intervals the writer encounters a plant which is full of ingenious time-, labor-, and cost-saving ideas and devices. Such an operation is that of the S. H. Bacon Materials Company, which operates a modern building-material yard and ready-mixed-concrete plant in Los Angeles, California. This yard and plant combine beauty with utility and everything connected with them shows signs of careful planning and thorough engineering. All the equipment used is new and of the best available type and there are none of the home-made crudities which in so many plants detract from operating efficiency and appearance.

The owner of this progressive organization is S. H. Bacon, who personally supervises production, sales, and the other departments of the business and who is to a large extent personally responsible for the design of this model yard and plant and many of the original methods used. Mr. Bacon has had a wide experience both in producing and selling building materials. He was in charge of sales for the Belvidere Gravel Company and, when this was purchased in 1927 by the Owl Truck and Materials Company, he moved into the sales department of that organization. In 1933 Mr. Bacon left this company and opened a small material yard in South Gate, a suburb southeast of Los Angeles. Early in 1938 the present yard, warehouse and office were built at 2070 Randolph Street in Los Angeles. The ready-mixed-concrete batching plant was put in operation in May, 1939. The S. H. Bacon Materials Company has supplied all the materials for many large building jobs.

Sand and gravel are delivered in the company's trucks from the bunkers of cooperating aggregate-producing companies and dry-batched aggregates are handled in the same manner. At the time of the writer's visit 20,000 cubic yards of aggregates was being delivered for the new Swift & Company plant in Vernon, a suburb of Los Angeles. This job will be finished up with 1,000 cubic yards of ready-mixed concrete. Ordinarily most of the concrete produced is used in building of all types as the company is in a growing industrial section of the city and near a number of growing residential sections. Some concrete is also sold for road and curb construction.

On the side of the yard facing the main street is the modern office building, which is constructed of wood and stucco. This building is attractively finished inside and has private offices in addition to the yard offices.

The warehouse is also pleasing in appearance and is built of wood with corrugated-metal siding and roofing and a concrete floor and foundation. Here are stored the various building materials sold by the company — cement, wire mesh, metal lath, plasterboard, lime, etc. The floor of this

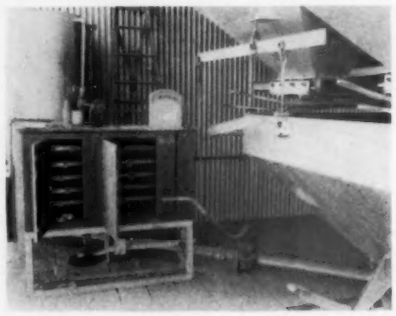
Center above: The mixer body is shown being lifted off the truck chassis. Left: The dump and mixer bodies in position on the hydraulic jacks. Right: The dump body being lowered into place on the truck chassis.

Left: Operator starting a load of cement on its way. Center: Operator and cement arriving at batching floor. Right: Operator dumping cement from car into truck-mixer loading spout.

building is at truck-bed level to facilitate loading. One man takes care of the warehouse and operates the concrete-batching plant.

Concrete operations were begun with 3 Blaw-Knox 3½-cubic yard mixers on Ford V-8 trucks. One of these mixers is permanently mounted on a 10-wheel, chain-drive chassis built around a Ford truck by the Likens Manufacturing Company. The other two mixers are mounted on Ford chassis equipped with the Likens system for replacing them with 7-cubic yard dump bodies. Two new 4-cubic yard Blaw-Knox mixers have just been ordered. These will be mounted on Ford V-8 trucks equipped with Likens dual, chain-driven rear axles and Brown-Lipe transmissions with 12 speeds forward and 3 in reverse. All these trucks have ten 9.75- by 20-inch tires and Heil hydraulic hoists. The trucks are operated with the regular single-rear-axle drives under ordinary conditions. The chains connecting the two rear axles are installed only when deliveries are to be made over rough terrain.

The interchangeable truck bodies are fastened to the frames by two pins, one on each side. The mixer bodies have pins at their front ends so their rear ends can be elevated for discharging their contents. The dump bodies have pins at the rear for rear discharge. The same Heil hoists operate both bodies and the hoists remain on the chassis. The change-over from dump body to mixer body is made in less than 20 minutes by means of three sets of four hydraulic jacks each at one end of the yard. The procedure is simple.



The aggregate gates and batcher with 5-beam scale and water valve at left.

The truck is backed between two pairs of jacks which are raised until the body is lifted sufficiently for the 2 pins to be removed. The body is then raised enough so the truck can run out from under it. The truck chassis is then backed under the mixer body, the pins are inserted, the jacks lowered and the truck is again ready for use. The use of three sets of jacks makes it possible to change either of, or both, the convertible trucks at any time and releases two expensive trucks for other work when there is a slackening in one type of work. These five trucks, including the two interchangeable units, can be used in the following combinations: one dump and four mixer trucks, two dump and three mixer trucks, or all five mixer trucks.

In addition, the company also has 2 Ford 10-tired dump trucks with dual chain-driven rear axles which pull trailers, each provided with a roll-off body and mounted on 4 dual-tired wheels. The loaded trucks and trailers are driven to the job, where the trailer is uncoupled and the material in the 11-ton truck body is dumped. The trailer is then recoupled to the truck and the loaded trailer body, which is smaller than the truck body, is rolled from the trailer or chassis into the empty truck body. The trailer chassis is then uncoupled from the truck and the contents of the 10-ton trailer body are dumped by the hoist mounted on the truck. The trailer chassis is then recoupled to the truck, its body is returned to place on it, and the outfit is ready to return for another load. This procedure may sound somewhat complicated but actually only a few minutes more time is required to dump both bodies than would be required to dump an ordinary truck. With this system the expense and nuisance of having a hoist on the trailer with the necessary connections are eliminated. The loads can be discharged in tight places were a trailer could not be dumped. The 21-ton load which can be hauled with one truck and one man

Sand being dumped from telescoped trailer body into the batching-plant hopper by the truck hoist.

is also important in this area of low-priced gravel, where a slight reduction in haulage cost may convert losses into profits.

The company also has 3 flat-rack trucks which are used for delivering wall-board, lath, reinforcing steel, etc. One of these has a body, also devised by the Likens Manufacturing Company, which is convertible into a dump body, and is equipped with a Heil hoist for dumping. This dump body has hinged sides and a tail gate which can be dropped level to form a flat body.

All the trucks were built around Ford V-8 motors, cabs and chassis by the Likens Manufacturing Company, which also devised the telescoping-body system and supplied all the trailers and bodies. In this process extra-strong frames were built, new rear ends were added and many other improvements made to convert the trucks into heavy-duty hauling units.

Several months ago all these trucks were converted for the use of butane gas as fuel. This gas, which is a waste product of oil refineries, has been used for this purpose on the Pacific Coast to a growing extent over a period of years, especially by long-distance haulers. This conversion consisted of the replacement

One of the 3½-cubic yard truck-mixers being loaded with aggregates. The cement spouts are in the foreground.

of the gasoline carburetors and fuel tanks by new ones. According to Mr. Bacon, the use of this gas has given the trucks 15 per cent. more power, which has reduced delivery time to an appreciable extent. Fuel costs have been cut more than 40 per cent. and crank-case dilution has been eliminated.

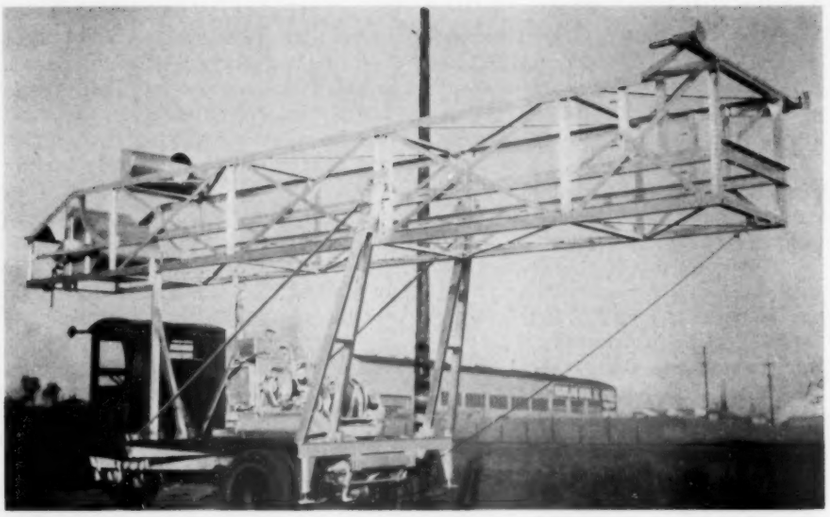
The butane gas is compressed into a liquid at the refinery and is delivered in special tank trucks, from which it is pumped into a 1,500-gallon surface tank in the company's yard. From this tank it is transferred to the truck fuel

The new batching plant showing truck-mixer being loaded.

tanks, where it builds up pressure and goes to the carburetor as a dry gas.

All repairs to the trucks and other haulage equipment are made in the company's well-equipped garage and repair shops. Several spare Ford engines for the trucks are kept on hand

Top: The truck and trailer bodies in their regular positions. Center: The trailer body telescoped into the truck body. Bottom: Rolling the trailer body back into place.



**Left: The 30-foot concrete tower in operating position. Bucket is operated by hoist on truck. Above: The tower folded down on the truck for removal to another location.**

to prevent delays when engines need overhauling.

The Likens Manufacturing Company also designed and built the simple and efficient concrete batching plant. With the 5 mixer trucks an ouput of 60 cubic yards of concrete per hour is easily attained on comparatively short hauls.

Sand and gravel are hauled in the company's dump trucks from the bunkers of producing companies and are discharged into a 12-ton steel hopper from which they are removed by a 50-foot belt-bucket elevator. An air-hammer in the truck hopper keeps the sand from sticking when damp. Four different sizes of aggregates are discharged into the four compartments of the 250-ton steel bin by means of a revolving spout which is controlled by a cable from the batching floor. From these compartments they pass through lever-operated slide gates into the 2-cubic yard weigh batcher, which is equipped with a 5-beam Fairbanks scale and a tell-tale dial. Aggregates are discharged into the truck-mixers through a clam-shell gate and spout.

Sacked cement is now being used, but it is Mr. Bacon's intention to install a bulk-cement-handling system, which is expected to reduce considerably the present loading time of two minutes by eliminating one of the two stops made by the trucks. Now the required number of sacks for each batch are loaded on a platform car running on an incline from the warehouse to the batching floor. This car is operated by a P & H hoist driven by a ⅝-horsepower electric motor through a cable. Two stanchions, which brace the sacks, are then removed and the cement is dumped through a spout on the top of the aggregates in the truck-mixer. When there is a steady demand for one type of mix, 16 sacks are brought up on the car each trip and the required amount of cement is dumped into a 27-cubic foot hopper from which it is loaded into the mixer body. This method reduces to some extent the time lost by the trucks in making two stops for loading. Water is measured in a 150-gallon tank with an automatic intake valve. The water is discharged into the truck-mixer through a 4-inch pipe. The mixer water tank is used only when additional water is found to be necessary at the job.

The latest addition to the company's already unique collection of equipment is a portable concrete tower which can be moved quickly from one job to another and which eliminates the necessity for a contractor to erect his own tower. With this tower concrete can be delivered to a customer at any elevation up to 20 feet within 30 minutes after the tower arrives on the job. The 30-foot steel tower is so constructed that, when not in use, it can be swung on a pivot into a horizontal position on the truck. The ½-cubic yard skip bucket is operated by a Hercules hoist mounted on the truck. This tower was designed and built by the Likens Manufacturing Company.

**Butane gas being loaded into tank of a truck-mixer which can be converted for sand-and-gravel delivery.**

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In the sand-and-gravel business for the past quarter century, the Northern Gravel Company of West Bend, Wisconsin is razing its old plant. In its stead will rise new, modern all-steel structures and considerable new equipment will replace older machinery.

## Convention

from page 75

However, a mention of some of them may be of interest.

"(a) Moisture Determinations of Sand and Gravel.—A member company of the association located in Washington desired to develop information with respect to variations in moisture content which would occur in sand and gravel under various conditions. His truck-mixers are loaded at several different points. Under one set of circumstances the materials were obtained direct from a sand-and-gravel yard, the bins of which are loaded with materials dredged from the river. Under another set of conditions he transports sand and gravel from such yards to outlying plants. Information on the amount of water which would drain out during the transportation was of interest, as well as information on the magnitude and uniformity of the moisture content at the different points. Two comprehensive investigations were conducted in coöperation with this association and utilizing facilities of the National Sand & Gravel Association at the University of Maryland—one during February, March and April and another during June, July and August. Valuable information was obtained which will be made available to the membership as soon as it can be compiled in form suitable for distribution. The out-of-pocket cost of conducting this investigation was defrayed by the member company in question.

"(b) Tests of Concrete Mixers.—A limited number of tests were made of the proportions and strength of concrete from different points in the batch of a truck-mixer. The ratio of mortar to coarse aggregate and the 28-day strengths of laboratory-cured specimens were determined. These tests are not sufficiently comprehensive to justify distribution, but they do point the way to an important investigation which should be made.

"(c) A.C.I. Committee 614.—During the year the association has continued its examination of the *Proposed Recommended Practice for Measuring, Mixing, and Placing Concrete* prepared by a committee of the American Concrete Institute, the membership of which includes several members of the association. . . .

"As uncorrelated as the activities of the association may appear from the preceding report it can be demonstrated beyond any question that they have been of outstanding benefit in promoting the interest of the industry. A great deal of additional work on the engineering phases of the industry is, however, still required.

"The effect of length of haul is a perennial question. Information in that regard on which current specifications are based was obtained some ten years ago. Since that time the characteristics of Portland cement, of mixing and agitating equipment and industry practices have changed. Current information comprehending modern conditions is badly needed. When that question is presented to us, as it frequently is, it is always embarrassing to base our answer on data which may be out-moded. A part of the question on the effect of the length of haul has to do with the effect of the temperature of aggregates and water on the characteristics of concrete. Available data are based on cements as they were manufactured ten or more years ago and information on modern cements is needed.

"Methods of sampling for determining the quality of concrete are inadequately outlined. The association should lend its coöperation to committees of organizations such as the American Society for Testing Materials in arriving at a satisfactory method.

"There is a general feeling among members of the industry that the lapse of time between mixing and placing which occurs in the ready-mixed-concrete industry has a beneficial effect on the characteristics of concrete and particularly on the tendency toward 'initial shrinkage.' We should determine quantitatively whether or not we are deceiving ourselves in that belief. . . ."

## New Process Hastens Concrete Units Curing

The Cemenstone Corporation of Pittsburgh reports that it has developed a process of hastening the curing of concrete products.

Concrete, using high-early-strength cement and 2 per cent. of calcium chloride per sack of cement, is placed in steam-jacketed forms, maintained at a temperature of approximately 130 to 150 degrees F. No unusual care is used in the control and placement of the concrete. In forty-five minutes precast-concrete floor slabs approximately 5 feet in length are removed from the forms and handled as though they were many days old. Concrete blocks, similarly cured, are ready for use within the same time after pouring.

The steam jackets and high-early-strength cement are necessary to accomplish this result, but just as important is the action of the calcium chloride. Its greatest value is secured under these concreting conditions. Not only does calcium chloride have an accelerating effect in producing this early setting of the cement, but it undoubtedly plays an important part in the control of the volume changes occurring during the hardening period.

D. R. MacPherson, research engineer for the Mellon Institute and who was formerly on the research staff of the Portland Cement Association is conducting many scientific studies affect-

**A hopper for receiving a full load of truck-mixed concrete and dispensing it into wheelbarrows and carts as needed is a recent development of the Ransome Concrete Machinery Company, Dunellen, New Jersey. This allows the truck mixer to be dismissed immediately and become available for other jobs. The hopper has a center discharge equipped with two lever-operating double clamshell discharge gates which direct the flow of concrete into barrows or carts. The use of this hopper eliminates all possibility of segregation of aggregates and assures a uniform load of concrete for the job. In actual practice it is said to average a saving of at least one truck mixer on an average-sized job.**

ing this general process—such as the value of vibration in reducing the water-cement ratio; the durability of this concrete, etc.

## Concrete Price War Raging in Buffalo

While the ready-mixed-concrete suppliers are getting from $6 to $7 a cubic yard for their product in most cities, Buffalo, New York, operators are reported to be delivering it to the larger jobs for $3.90 to $4.60 a yard.

This is because of an intensely competitive situation. All six of the Buffalo companies admit that at this price they scarcely can break even and some say that the price ought to be at least $1 a yard more to allow even a slim profit.

Meanwhile, the big contractors needing thousands of cubic yards of concrete for building jobs are standing on the sidelines and doing some cheering. They can buy the ready-mixed article for almost $1 a yard less than it would cost them to mix it on the job.

Leaders in the Buffalo ready-mixed concrete industry are fully aware that the business would be better off if something were done to eliminate cut-throat competition. They would be only too happy if some way could be found to bring the companies together into an agreement to charge a reasonably uniform price for their product. But efforts in the direction of price fixing, especially in the field of building materials, would bring down the wrath of the Federal Trade Commission.

The result is that when big jobs come up in Buffalo, each bidder is so anxious to offer the lowest possible price that caution is thrown to the winds. Rumor has it that on one big job the contractor bought specification ready-mixed-concrete at a flat rate of $3.90 a cubic yard. The cost of the cement in that cubic yard figures at $2.35. Added to this was the cost of the sand and gravel, approximately 85 cents a ton, the cost of the labor in getting the ingredients together and the cost of trucking it through the streets.

To-day there is not a building contractor in Buffalo who can afford not to use ready-mixed concrete, because the price is so low. Many have said that if the prospective home owners realized that ready-mixed-concrete is so "cheap" in Buffalo, it might provoke a wave of concrete house building, to the dismay of suppliers of other materials.

### ● Truck-Mixer

The 1940 model truck-mixer manufactured by the Concrete Transport Mixer Company of St. Louis has the following new features:

1. Self-supporting and self-locking side-discharge chute.

2. Corner fillets on interior of drum to eliminate build-up.

3. Replaceable steel liner plates to preserve the original drum shell.

4. Streamlined observation platform optional on side of mixer to facilitate the exclusive visible mixing action.

5. Two-speed power take-off to enable driver to regulate mixing or agitating speed.

Three models are available. One has a 1 cubic yard rating as a mixer, another 1½ cubic yards, each having ½ cubic yard greater capacity as agitators. The third model is available only as a 2-cubic yard agitator.

### ● Block Machine

A popular unit in the Miles line of modern concrete-products plant machinery is shown herewith. It is manufactured by the Miles

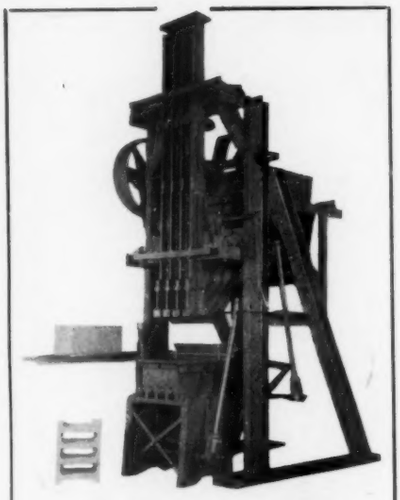
Combination block machine.

Manufacturing Company, Jackson, Michigan. This rapid producer of high-quality products consists of the Miles stripper machine, Miles automatic power tamper and Miles automatic measuring and feeding hopper.

### ● Paint

The Bedard & Morency Mill Company, Oak Park, Illinois, is marketing a new product known as Porce-Tite—a white waterproof and fireproof paint which gives a white porcelain-like surface. The manufacturer recommends it for use on exterior or interior surfaces such as concrete, brick, concrete and cinder blocks, stucco, etc. When mixed to a mortar consistency Porce-Tite can be used for filling cracks or holes in all types of masonry.

Porce-Tite contains no oil, casein or cement, but is a compound of inorganic materials, chemically treated to produce high waterproofing qualities. It is easily applied with brush or spray, sets in three hours and dries in twelve hours, producing a smooth hard surface which repels grease and dirt. Due to this surface it can be washed with paint clean-

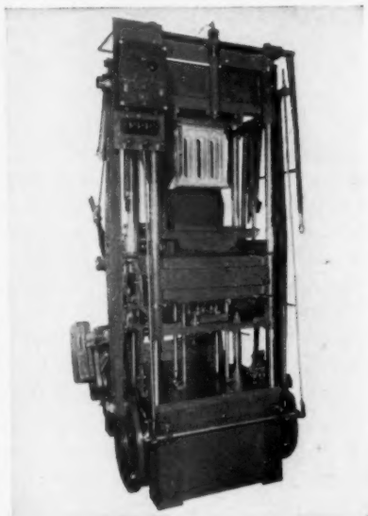
**An All-Purpose Machine**

The Junior Stripper will turn out more blocks per man than any other hand-operated machine on the market . . . 200 per hour being easily maintained! Nor has quality of output been sacrificed for the sake of speed. Units are uniformly dense, true to shape, of uniform texture.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers and Joltcrete, Stearns mixers, and Cast Iron and Press Steel pallets Straublox oscillating attachments, etc. Repair parts for: Anchor, Ideal, Universal, Stearns, Blystone mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
G. M. Friel, Manager — Columbus, Ohio

VIBRATION
—combined with
Pressing Makes the Best Blocks



Here's the Machine That Does It

KENT MACHINE CO.
Cuyahoga Falls, Ohio

## STANDARD
**Wherever Concrete Pipe Are Made**

**R&L "CRESCENT" Pipe Molds**

**For Either Wet or Hand Process Manufacture**

Made in any length or diameter with either Tongue and Groove, Bell and Spigot or Plain Ends.

Medium, Heavy and Extra Heavy Duty Forms for Sewers and Culverts, Well Casing, Drainage, Septic Tanks, etc.

**WRITE** for Catalog and Prices.

**R&L CONCRETE MACHINERY CO.**
**Kendallville, Indiana.**

*For more than 35 years makers of dependable concrete pipe molds and pipe machines.*

Applying the ceramic paint to a masonry wall.

ers and washing compounds without marring or destroying the finish.

The new paint is a chemical ceramic, which bakes itself to the surface and is unaffected by most industrial acids or fumes. As it is composed of inorganic materials, there is no attraction for vermin of any kind. A peculiar feature is that it expands in setting, thus securing a perfect bond to the surface.


## FOR SALE

Used Stearns Power Block Machine, Anchor 8 Bar Tamper, Anchor Jr. Stripper with Attachments and Pallets. Also Electric Truck, Conveyor, Vibrating Table, Pallet Oilers, Bucket Drags and Stokers.

**PYRAMID BLOCK COMPANY**
National at 67th St. West Allis, Wis.

## LESS DEAD WEIGHT

**COMMERCIAL CORED STEEL PALLETS ARE LIGHTER IN WEIGHT**

In one day's production of two thousand 8" blocks, the plain pallet user handles approximately 108,000 pounds more pallet weight than the cored pressed steel pallet user and 88,000 pounds more pallet weight than the cored cast iron pallet user. Or equivalent in human effort to handling two carloads of material—*every day!*

**THE COMMERCIAL SHEARING AND STAMPING CO.**
YOUNGSTOWN, OHIO



## *Follow the* SMITH-MOBILE *Parade!*

**Ready Mixed Concrete Operators All Over the Country Say: "It's TOPS"**

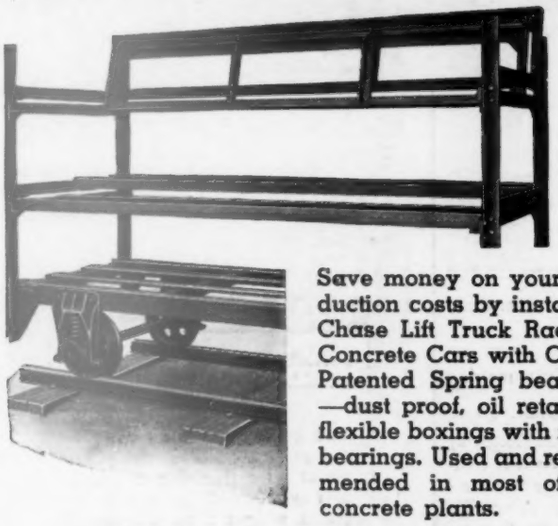
Proven performance on hundreds of jobs has won for SMITH-MOBILE a host of friends. It's really amazing how fast this remarkable truck mixer has won the esteem of ready mixed concrete operators everywhere. Illustrated here are 10 Smith-Mobiles owned by Pacific Coast Aggregates, Inc. Four more are now on order. Certified Concrete Ltd., New Zealand, operate 9 Smith-Mobiles. C. S. Barlow & Sons, Tacoma, own 5. These are just a few. The trend is definitely toward Smith-Mobiles. HIGH DISCHARGE without hoist or ramp . . . CONTROLLED DISCHARGE without segregation . . . VISIBLE MIXING . . . FAST FEED CHUTE CHARGING . . . these are all exclusive SMITH-MOBILE features. Write for catalog.

**THE T. L. SMITH COMPANY**
2887 N. 32nd STREET MILWAUKEE, WISCONSIN

## THE *Modern* TRUCK MIXER and AGITATOR

The CONCRETE MANUFACTURER

**LOW INITIAL COST**
**LOW MAINTENANCE COST**



Save money on your production costs by installing Chase Lift Truck Rack or Concrete Cars with Chase Patented Spring bearings —dust proof, oil retaining flexible boxings with roller bearings. Used and recommended in most of the concrete plants.

WRITE
For Catalog and
Special Low Prices

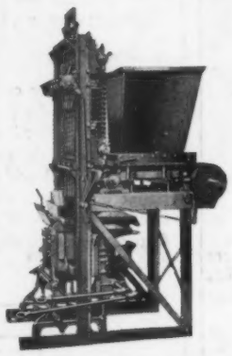
Complete line of concrete block cars, decks, Lift Truck Racks, transfer cars, turntables, dump cars, etc.

**CHASE** DRYER CARS & TRANSFER CARS
CHASE FOUNDRY & MFG. CO. COLUMBUS, OHIO

Miles CONCRETE EQUIPMENT

**INVESTIGATE BEFORE YOU BUY**

the PIONEER EQUIPMENT of the industry, not an experiment, but a proven success with which you are assured a larger production of high quality blocks at both a lower first cost and a lower operating cost, facts well worthy of your serious consideration.



*WRITE FOR CATALOG*

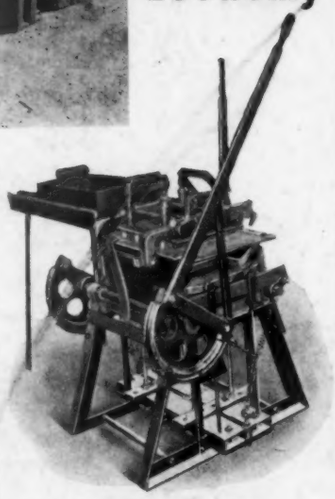
**THE MILES MANUFACTURING CO.**
Dept. 20
JACKSON, MICHIGAN

**You Can't Beat It for Economy**

HERE'S NEWS! An inexpensive but powerful hand-operated DOUBLE PRESS Concrete Block Machine that makes high-strength building units at new low cost.

Machines available for any size or design of block or brick desired. Capacity up to 4 units per minute.

Why tie up your money in a high priced machine, when you can buy a Double Press Machine that will do equal quality work!



Patented
*Write Today for Facts*

**MORTARLESS TILE MACHINE COMPANY, Inc.**
3328 San Fernando Road
Los Angeles, California

MORE PROFITS LOWER COSTS

**THE KIRKHAM VIBRATOR**

**Makes dense-strong-weather-proof concrete blocks**

Positive Vibration
Compact Portable
Economical operation from your light socket
Plain wooden or steel pallets
Mold boxes changed in a few minutes

**CONCRETE TRANSPORT MIXER COMPANY**
660 ROSEDALE AVE. ST. LOUIS, MO.

# Only JAEGER Offers These Advantages--

DRIVE FROM THE TRUCK ENGINE THRU SHOCK-PROOF TRANSMISSION, VACUUM-CONTROLLED FROM CAB (or separate engine drive if desired).

DUAL-MIX DRUM produces higher strength concrete—as proved by the Hollister Tests.

THROW-BACK REVERSING BLADES—proved essential to a fast, thoro mix.

DUAL REVOLVING WATER SPRAYS spray to both ends of drum, insure faster, more uniform water distribution.

SYPHO-METER TANK insures accurate water control.

RUST AND ABRASION-RESISTING ALLOY STEEL—lighter, stronger, longer lived.

RECOGNIZED LEADERSHIP—more concrete is sold with Jaeger Truck Mixers than by any other method.

**THE JAEGER MACHINE CO., Columbus, Ohio**

**SEND FOR YOUR COPY OF THIS 68-PAGE DATA BOOK FOR READY-MIXED PLANTS**

Whether you are already operating a ready-mixed plant or planning to start one, you will find this book an invaluable guide and reference on modern truck mixer and agitator operation, compiled by the world's largest manufacturer—up-to-date, authoritative, complete.

THE JAEGER MACHINE COMPANY
602 Dublin Avenue, Columbus, Ohio
Gentlemen:
We are interested in 1940 data on Ready Mixed Plants with Truck Mixers and Agitators, including set-up, operation, maintenance costs, selling of strength concrete, etc., as well as new developments in mixer design.

Name .....

Address .....

# Multiplex

## MEANS *MORE* BUSINESS

• • •

And the Concrete

## SUPER TAMPER

is Engineered and Built to GET it

Successful business operations depend upon sustained PERFORMANCE—not claims. Years of study and research by our engineers resulted in the Multiplex Super Tamper—every part designed for perfect performance in producing concrete blocks.

This heavy duty, all-steel welded machine makes strong units with less tamping—reduced agitation of material and less vibration insure longer life. Has positive and automatic feed control; is adaptable for all kinds of aggregates.

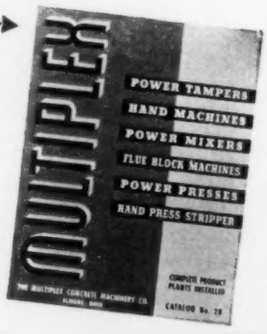
Multiplex Super Tamper produces evenly finished and uniform units in all standard sizes, up to 6 per minute.

"SUPER TAMPER" Super Performance puts your business on solid concrete foundations.

* * * * *

*Ask for facts* about our new screw paddle Multi-Mixer—gives greater speed, more uniform mix.

*Write for your copy* →




*The* **Multiplex** CONCRETE MACHINERY COMPANY
ELMORE, OHIO



*"We're in this business to make money —and can do it with* **BLAW-KNOX TRUKMIXERS** *because they mix concrete faster and we get more trips per day"*

It's a comfortable feeling to have truck mixers working for you that perform 100% under all conditions. No breakdowns—no worries.

You make a *profitable investment* when you buy Blaw-Knox Trukmixers and agitators. 24

**BLAW-KNOX** BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.
*Agitators and* **TRUKMIXERS**



## START A NEW BUSINESS

*This shows one of our Multiple Molds for casting 8x8x16" concrete blocks. We manufacture a complete line of Multiple Molds for blocks (both Rockface and plain), for brick, veneer blocks, etc. We are also owner and originator of the ZAGELMEYER SYSTEM of granite veneer for blocks.*

*Make* **ZAGELMEYER** *Waterproof Concrete Blocks*

***A Start May Be Made With as Little as $500.00***

The Zagelmeyer System produces a block that no other system can equal. Many good territories open. Write today for further information.

**Zagelmeyer Cast Stone Block Machinery Co.**
502 S. Henry St. BAY CITY, MICH.



## HOTEL PHILADELPHIAN

**FORMERLY HOTEL PENNSYLVANIA**
**DANIEL CRAWFORD, JR., MANAGER**
**39th and CHESTNUT STREETS**
**PHILADELPHIA, PENNA**

Our courteous and competent staff will give you the utmost in friendliness, comfort and service. Conveniently located to all stations, and only five minutes away from the heart of the business section.

**600 ROOMS each with bath from $2.50 up**

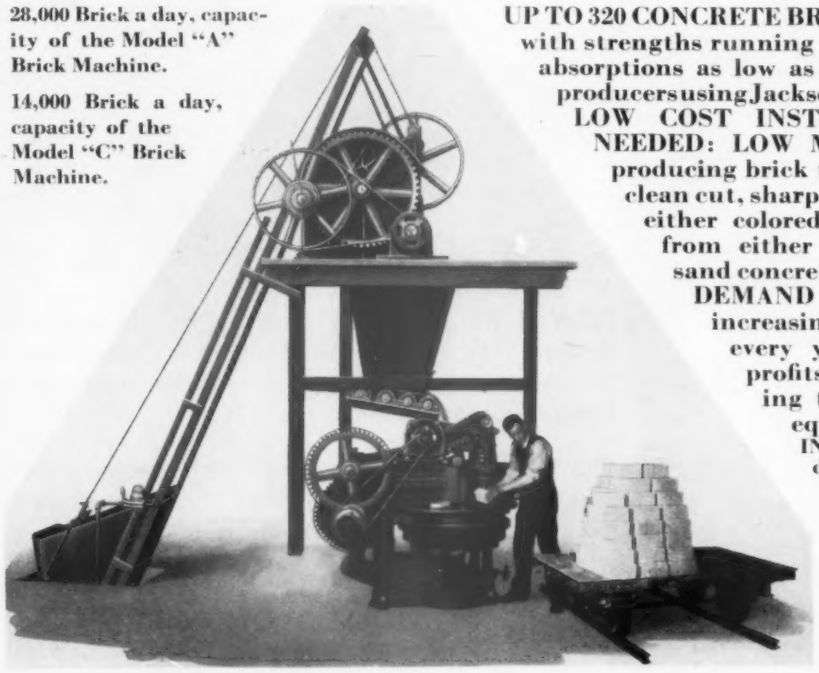
***Lounge and Restaurants*** ***Unrestricted Parking to 3 A.M.***

# "PRODUCTION SPELLS PROFITS"

## THAT'S WHY JACKSON BRICK MACHINERY IS THE ANSWER

28,000 Brick a day, capacity of the Model "A" Brick Machine.

14,000 Brick a day, capacity of the Model "C" Brick Machine.



UP TO 320 CONCRETE BRICK PER SACK OF CEMENT with strengths running as high as 3700 lbs. p.s.i. and absorptions as low as 6.7% is being had by some producers using Jackson & Church Brick Machinery. LOW COST INSTALLATION: NO PALLETS NEEDED: LOW MAINTENANCE COST, and producing brick that are uniform in size with clean cut, sharp edges and beautiful textures, either colored or plain. Will make brick from either light weight aggregates or sand concrete.

DEMAND FOR CONCRETE BRICK is increasing every day, millions sold every year. Let us show you the profits that can be had when making them on Jackson & Church equipment.

INVESTIGATE TODAY, get into production for the coming spring business. Our engineering department is at your disposal to assist you in your equipment selection and plant layout.

*Since 1881*

**JACKSON & CHURCH CO.**

SAGINAW, MICH.

# A Salute to Ideal Cement Stone Co. of Omaha

CONGRATULATIONS to the Ideal Cement Stone Co. on its latest forward step in the installation of two Stearns Joltcrete Machines. This pioneer products manufacturer (whose plant is described elsewhere in this issue) has always striven to deliver to its customers a product of unsurpassed quality. It maintains that fine tradition by making Stearns Joltcrete Blocks available to the building industry. Thus it joins that growing number of progressive products plants in this territory equipped to serve their trade with the best in masonry units.

Throughout the West, as elsewhere, architects and builders are asking for Stearns Joltcrete Blocks. If you want to profit by this growing demand, find out more about the equipment required, whether it be large or small, and what it costs.

Ask Alfred N. Olsen

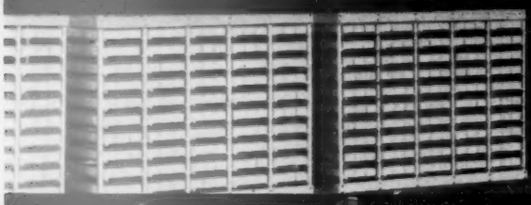
Olsen Sales Company

205 Carroll St. Rock Rapids, Iowa

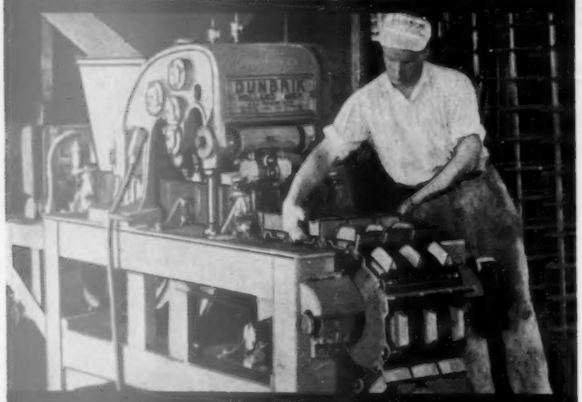
*"Someone Must Sell the Best"*

The CONCRETE MANUFACTURER

# MANUFACTURING ---- OPPORTUNITIES PROVEN BY OPERATING PLANTS 35 YEARS DEVELOPMENT



Lighter weight, lower absorption, greater strength, absolute accuracy in all dimensions -- multiple sizes permit structural improvements and short-cuts that make possible permanent, fire-safe building at cost level of frame.



Automatic line production equipment for economical production from 3,000 to 30,000 DUNBRIK per day, or its equal in multiple size DUNSTONE. Labor costs in operating plants show as low as $1.10 per thousand.

Two exclusive time proven processes offer full range of colors, shades and textures, enabling you to profitably serve the complete material market in your territory.

**NOW IS THE TIME** to cash in on the growing building industry. Make this better building material — that cuts building costs at every step — the kind your builders demand and are waiting for.

**BIG EARNING POWER** considering modest investment required. Quickly accepted by building trade wherever manufactured. Highest quality materials economically manufactured with small crew producing sales volume up to $300.00 per day.

**WE EQUIP YOU** with a Line Production Machine — Your surplus aggregate enters at one end — finished products emerge from the other — You make light weight, scientifically designed units in more than 40 beautiful colors, shades and textures.

**YOU GET** as Authorized Manufacturer in your territory the benefit of this company's 35 years of development, research and engineering. All this will be at your disposal in assisting you in manufacturing and merchandising your products.

**INVESTIGATE THIS PROVEN** manufacturing opportunity. Fill in the coupon today. Do this while your territory is still open. Take your first step to manufacturing independence. Act now.

2-40

W. E. DUNN MFG. CO.
420 W. 24th St.,
Holland, Michigan.

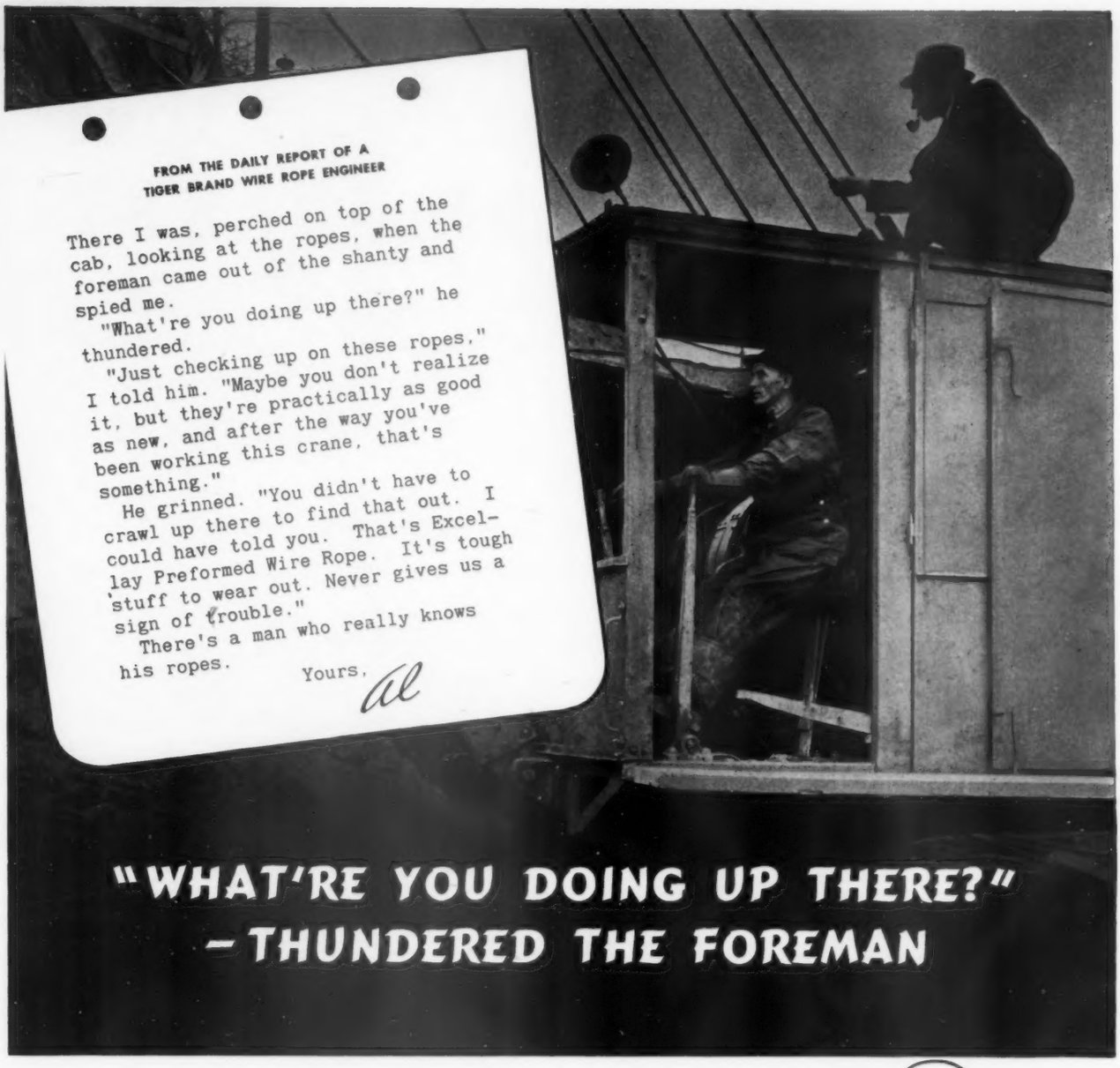
Show me through your free books all about this exclusive manufacturing opportunity for me in this territory.

Tell me where I can visit a nearby manufacturing plant and see how better buildings are being built for less with this permanent material.

Name_____

Address_____

City_____ State_____


FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER
There I was, perched on top of the cab, looking at the ropes, when the foreman came out of the shanty and spied me.
"What're you doing up there?" he thundered.
"Just checking up on these ropes," I told him. "Maybe you don't realize it, but they're practically as good as new, and after the way you've been working this crane, that's something."
He grinned. "You didn't have to crawl up there to find that out. I could have told you. That's Excellay Preformed Wire Rope. It's tough stuff to wear out. Never gives us a sign of trouble."
There's a man who really knows his ropes.
Yours,
al

# "WHAT'RE YOU DOING UP THERE?" —THUNDERED THE FOREMAN

OUR field engineers are interested in seeing that you get a full dollar's worth of value out of every dollar you invest in wire rope. Most of their time is spent right out where the rope is used. There's no better place to keep in touch with wire rope performance.

That's why these engineers are qualified to give you service that is both helpful and speedy. Besides helping you select the most practical wire rope, they can often give you valuable, money-saving tips on operation. Be sure to take full advantage of their wide experience.

American Tiger Brand Wire Rope is made in all constructions and grades. Our engineers can help you specify the type best suited to your job. Ask one of these men to call.

**EXCELLAY** *Preformed* **WIRE ROPE**

**AMERICAN STEEL & WIRE COMPANY**
Cleveland, Chicago and New York
**COLUMBIA STEEL COMPANY**
San Francisco
United States Steel Export Company, New York

**UNITED STATES STEEL**

# Readers and Advertisers Alike Prefer PIT AND QUARRY

For nearly a decade Pit and Quarry has led the field in subscriptions among producers. Its popularity has grown constantly, its margin of lead increased steadily, not by any sudden bound due to special offers or inducements. Its volume of advertising in 1938 was definitely larger than that of any other paper in the field.

The reason? At no time has Pit and Quarry compromised with its high editorial standards. It has held its editorial staff, and kept its field editor on the road, wearing out a car in one to two years. The illustrations have always been plentiful, the articles easy to read.

Costly to do this? Yes, it is. But it has been worth the cost, for producers realize that Pit and Quarry has worked with them. And the high percentage of subscribers who renew their subscription attests their loyalty to a publication understanding their problems and working with them.

The subscription price is still only one dollar for a full year's service. If you are not already a subscriber, why not send in a dollar and learn why other producers find Pit and Quarry so valuable? The cost is small—the results so large—don't delay.

*Return This Coupon To-day—Start Your Subscription with the February issue*

PIT AND QUARRY PUBLICATIONS,
538 So. Clark Street, Chicago, Illinois.

Enclosed find remittance for which enter my subscription to Pit and Quarry for.....
1 year ($1.00) .....starting with the February issue. (Foreign add $1.00 per year.)

My Name..... Title.....

Company Name .....

Send to (Address).....

We Produce.....

We'll Send You "ROPE DOPE" regularly!

"Rope Dope" is *not* an advertising medium. It is a periodical bulletin which explains simply and intelligently the highly technical phases of Wire Rope—its applications and uses . . . There's no obligation on your part—but a lot of valuable information in store for you.

WIRE—WRITE—or consult your Telephone Directory.

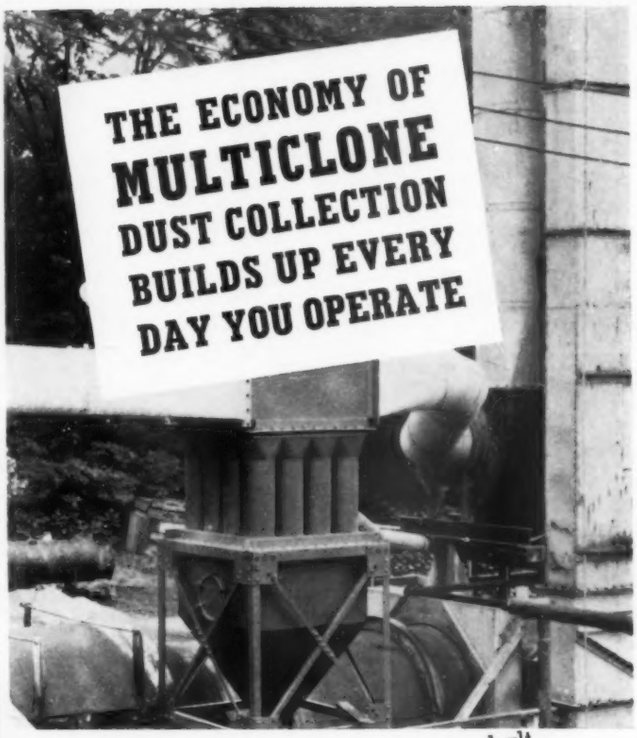
UNION WIRE ROPE CORPORATION
2132 Manchester Ave. Kansas City, Mo.

UNION Wire Ropes

The "ULTIMATE LOW COST WIRE ROPE"

B






Multiclone Dust Collectors at asphalt plants, rock crushing and sand drying plants are operating in capacities varying from 6000 to 50,000 c.f.m. at total efficiencies up to 97% or higher.

With an Impax Separator ahead of the Multiclone, coarse particles are automatically collected in a separate hopper.

Recorded temperatures at hot and cold mix plants range from atmospheric to 500° F.

Cast iron vanes, cones and liners insure long life and economical replacement.

Multiclones are highly efficient in recovering cement dust from kilns, and can be designed to collect a high percentage of particles down to the lower micron brackets.

In a recent 90,000 c.f.m. installation, the over-all efficiency is 95.5% collection of all plus 5 micron sizes, and 99.5% of all particles 10 microns and over.

Typical Multiclone tube unit in section showing cast iron vane and renewable cone. Assemblies are made in parallel for any capacity.

WESTERN PRECIPITATION CORPORATION
1016 West Ninth Street
Los Angeles, California
Chrysler Bldg., New York

Write now on your executive letterhead for new Bulletin—free.

MULTICLONE
MECHANICAL DUST COLLECTORS



# Still Going Up!

The number of executives subscribing to PIT AND QUARRY rises steadily.

Every month occasional readers decide to make the reading of PIT AND QUARRY a regular habit and so the list of paid subscribers grows. Why not make the same decision for yourself today and have the copies addressed to you personally? As an added means of preventing delay in receiving their copies many executives have PIT AND QUARRY sent to their homes, where it can be read at leisure and in comfort.

PIT AND QUARRY is subscribed to by more than 2,200 administrative and production executives—presidents, vice-presidents, general managers, superintendents, engineers, chemists, production managers, etc. For years it has had more producer subscribers than any other paper reaching the non-metallic-minerals field.

Whatever your company's products may be, whatever your personal responsibility may be, whatever industrial problems may interest you most, PIT AND QUARRY should be your choice for news, for descriptions of new plants, processes and equipment, and for practical discussions of the matters that vitally affect your business.

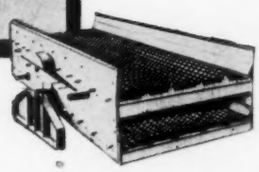
The price is still $1 for one year.

**PIT AND QUARRY PUBLICATIONS**
**538 South Clark Street** **Chicago, Ill.**

Publishers of *Pit and Quarry Handbook* and *Pit and Quarry Directory*

**ROBINS MAKES**

Belt Conveyors
Idlers
Belts
Bucket Elevators
Screens
Screen Cloth
Feeders
Bin Gates
Hoists
Grab Buckets
and all their accessories
Send for bulletins



You can separate exact sizes with Robins GYREX, VIBREX and ELIPTEX Screens. Robins Screens are fast, accurate and use but little power.

**ROBINS CONVEYING BELT COMPANY**

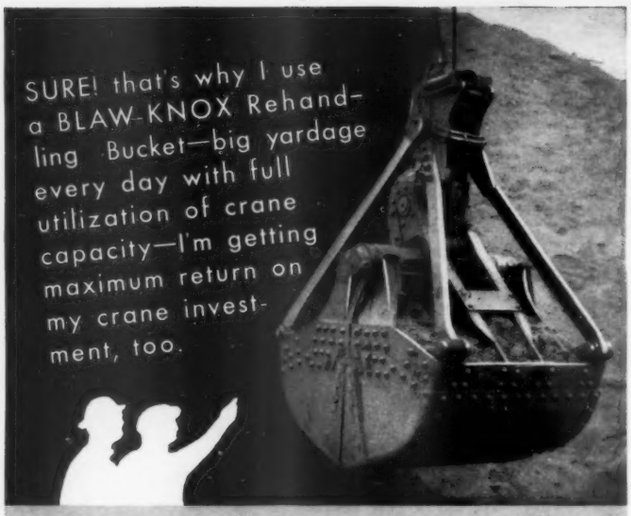
MATERIAL HANDLING ROBINS EQUIPMENT

15 Park Row, New York, N. Y.

Offices in principal cities.



SURE! that's why I use a BLAW-KNOX Rehandling Bucket—big yardage every day with full utilization of crane capacity—I'm getting maximum return on my crane investment, too.



Bulletin 1606 entitled Blaw-Knox Buckets for Contractors shows how to select a bucket to secure the profitable difference between peak and ordinary performance—it will be sent on request.

BLAW-KNOX DIVISION of Blaw-Knox Company
FARMER'S BANK BUILDING PITTSBURGH, PA.

**BLAW-KNOX**
**REHANDLING BUCKETS**



**SAUERMAN LONG RANGE MACHINES**

**MOVE MATERIALS FOR A FEW CENTS PER TON**

Sauerman Scraper handles 100,000-ton storage pile of crushed rock for cement mill.

One man with small Sauerman Cableway digs 500 tons of river gravel per day.

IN deciding what type of equipment to adopt for any problem of excavating or stockpiling, consider the following good reasons for choosing a Sauerman machine:

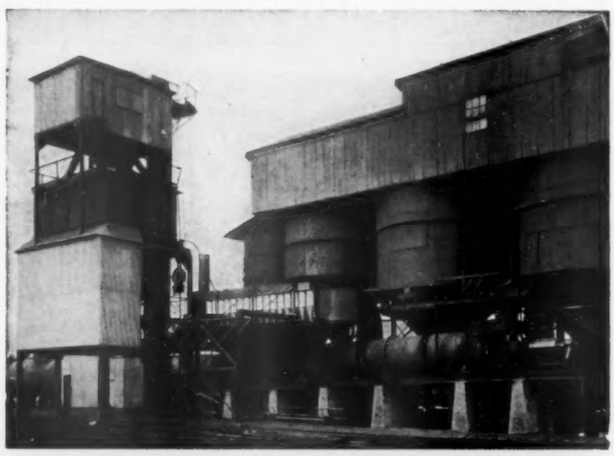
(1) Sauerman machines dig, convey, and dump in a continuous automatic operation.
(2) First cost is reasonable.
(3) Operated by one man.
(4) Maintenance is simple.

As a result of the above features, Sauerman machines are able to handle wet or dry excavation and the storing and reclaiming of bulk materials at the lowest possible cost per cubic yard. Hundreds of leading pit and quarry operators will testify to the truth of this statement. We'll be glad to study your problem and tell you what a Sauerman machine can do for you.

*WRITE FOR CATALOG*

**SAUERMAN BROS., INC.**
**434 S. Clinton St., CHICAGO**





WARREN ASPHALT PLANTS
HOT MIX —— COLD MIX
—— OR ——
COMBINATION UNIT FOR BOTH TYPES
CAPACITY DESIGN AND ARRANGEMENT TO MEET ANY REQUIREMENTS

Designed and Built
—— By ——
WARREN BROTHERS ROADS CO.
P. O. BOX 1869
Boston Massachusetts

BULLETINS

Type H Blake ..... 1105
Type TY Reduction ..... 2112
Multi-Stage Reduction ..... 113

*GOING BETTER THAN EVER!*

# TRAYLOR

## TY REDUCTION CRUSHER

Sustained and increasing sales of crushers come about for only one reason, and that is the intrinsic worth of the machines themselves.

Hundreds of operators have demonstrated to their entire satisfaction that the Traylor Type TY Reduction Crusher does more work, more satisfactorily, at less cost and at lower capital outlay than they have previously experienced.

*HERE'S A "HOT" TIP—*

Use a Traylor Type H Blake Jaw Crusher AHEAD of a Traylor Type TY Reduction Crusher and a Traylor-Stearns Multi-Stage Fine Reduction Crusher AFTER the TY. You'll have a set-up that will make anything you can sell—at unbeatable efficiency. Investigate this critically—send for all three bulletins or have our man in to talk it over!

**TRAYLOR ENGINEERING & MANUFACTURING CO.**
*ALLENTOWN, PENNSYLVANIA, U.S.A.*

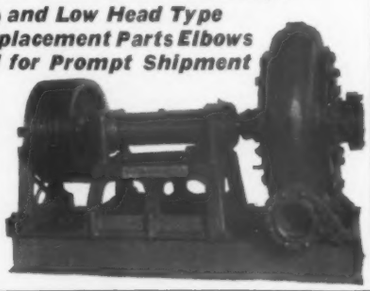
NEW YORK CITY 3916 Empire State Bldg. | CHICAGO 815 One La Salle St. Bldg. | SALT LAKE CITY 101 West Second South St. | LOS ANGELES 919 Chester Williams Bldg. | SEATTLE 6311 22nd Ave., N. E.

MAQUINARIA INTERNACIONAL, S. R. L., Av. Francisco I. Madero No. 17, Desp. 214, Mexico, D. F., Mexico
B. C. EQUIPMENT CO., LTD., Vancouver, B. C., Canada
MANILA MACH. & SUPPLY CO., INC., Manila and Baguio, P. I.
Export Department—104 Pearl St., New York City.
Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Autofagasta, Oruro.

**LIGHTNING**

**Sand and Gravel Pumps**

**Heavy-Duty (Ball-Bearing) and Low Head Type**
**Complete stock of Replacement Parts Elbows and Fittings Carried for Prompt Shipment**



High efficiency—low operating cost — precision workmanship—wear-resisting, non-heating bearings even when operated under extremely high heads. WRITE

**KANSAS CITY HAY PRESS CO.**
**KANSAS CITY, MO.**

**SIMPLICITY**
**GYRATING SCREENS**

The Leader in Improved Screening
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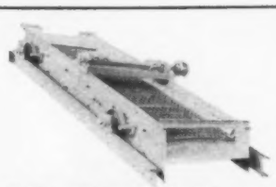

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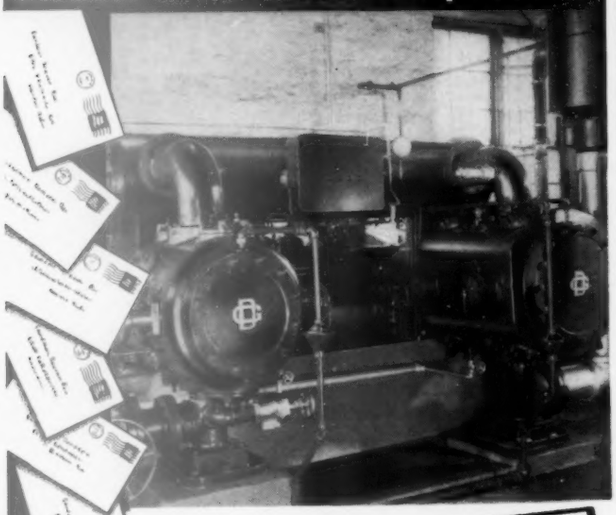

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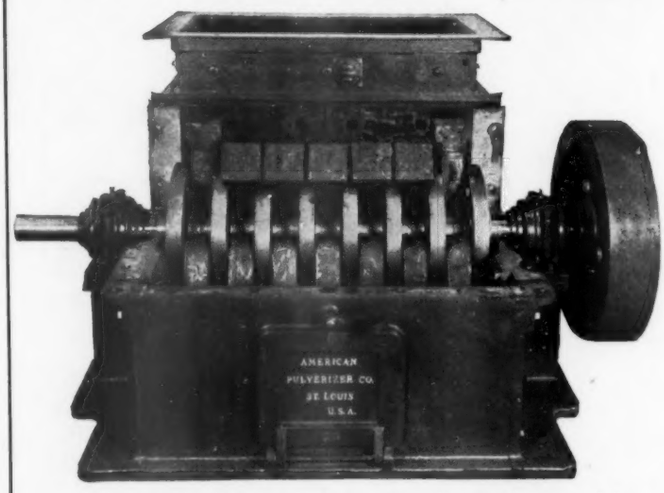


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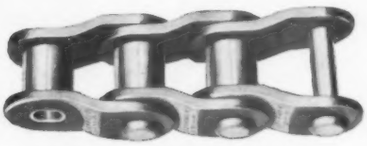

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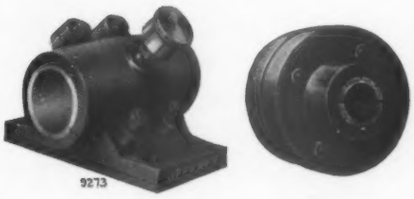

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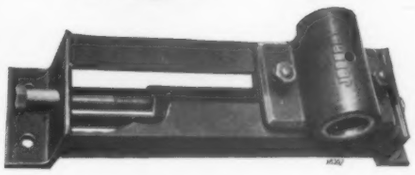

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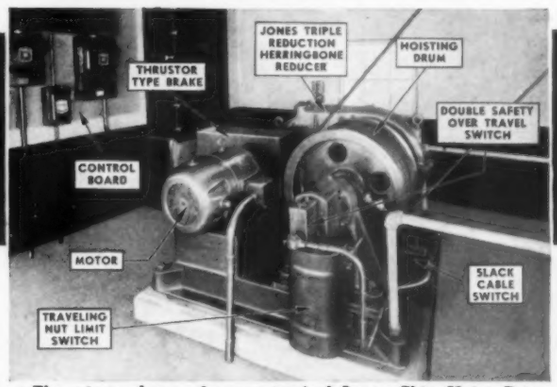
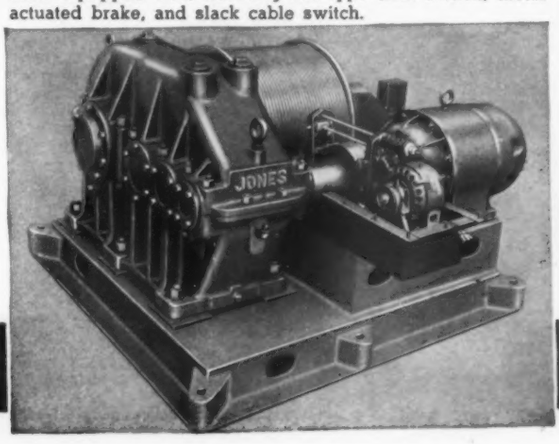



● The view above shows a typical Jones Skip Hoist Drive installation while the view below shows one of the Jones units equipped with traveling nut type limit switch, motor actuated brake, and slack cable switch.

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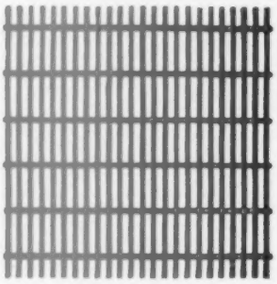

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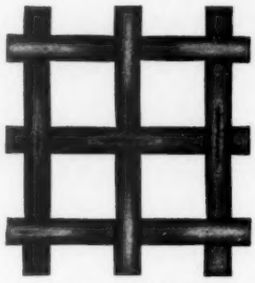

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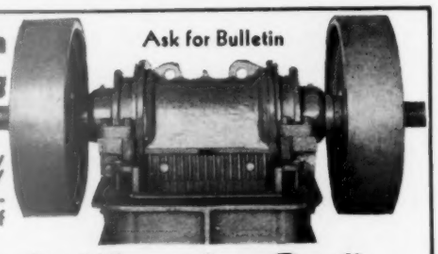

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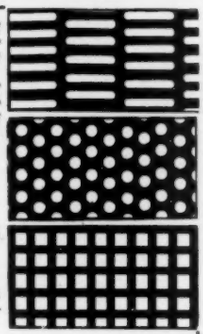

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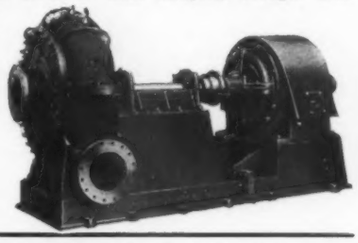

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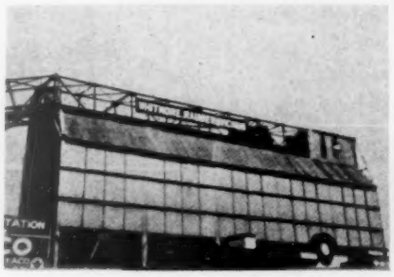

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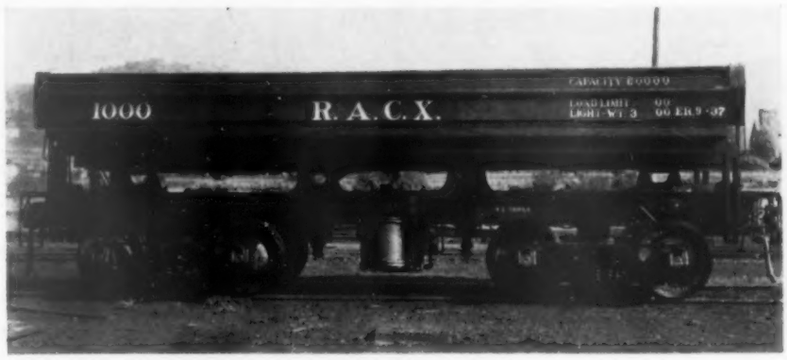


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10"—CI pipe—70 lb. rail—24" belt.
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| 30 HP Motor | GE | 220 V. 3 ph. 720 RPM |
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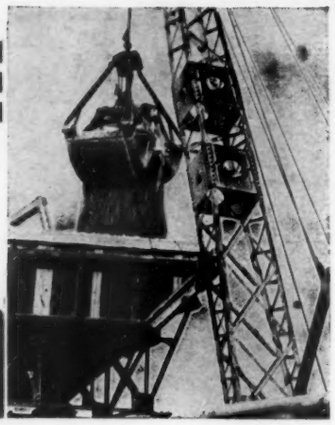


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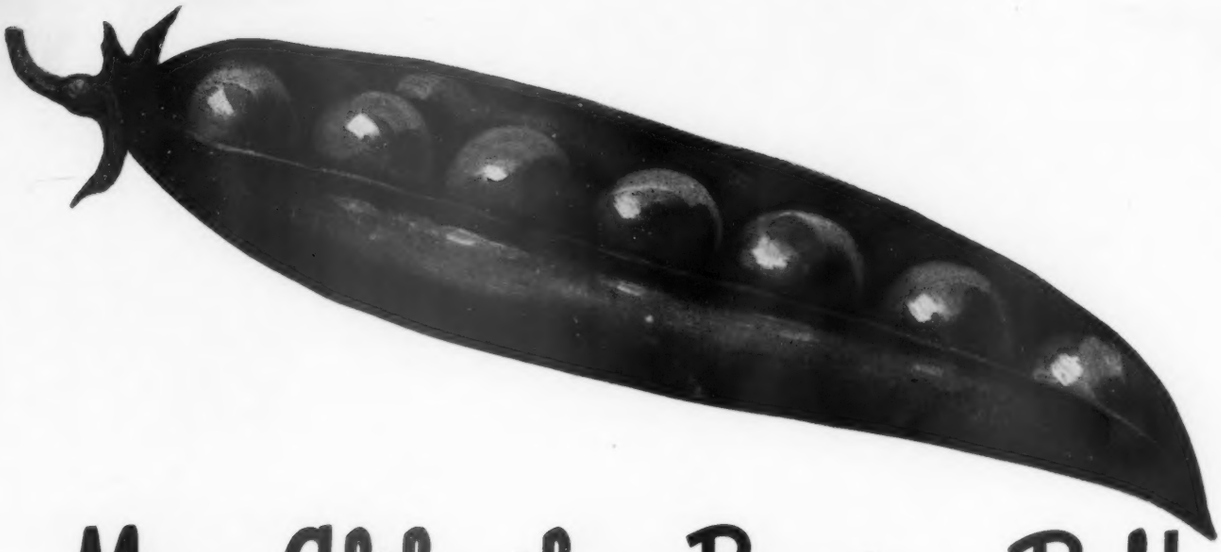

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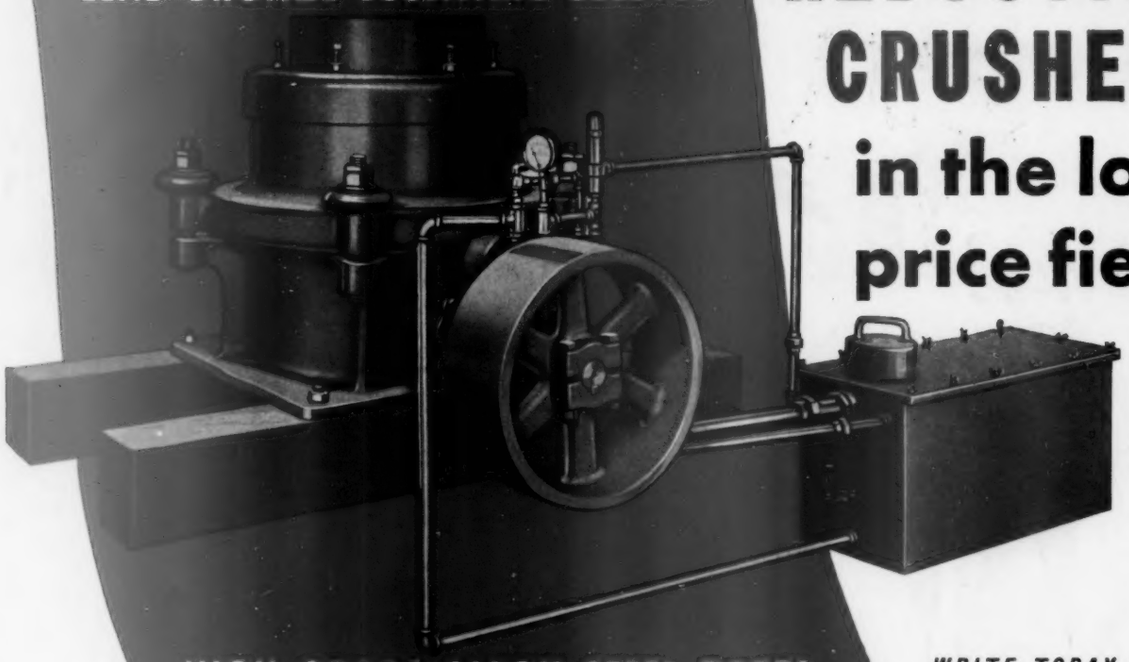

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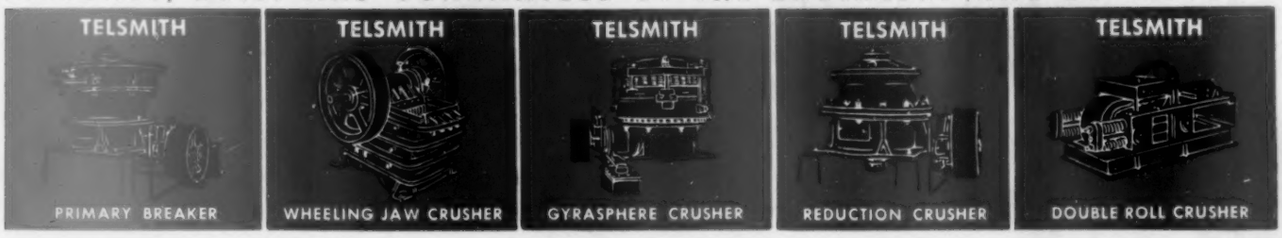
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